User Manual

TNS-Wii3

UART WiFi MODULE

คู่มือการใช้งาน TNS-Wii3

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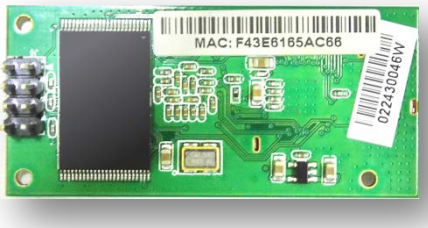
UART WiFi module



revision 1. 41

1. บทนำ

โมดูล TNS-Wii3 ถูกออกแบบมาเพื่อให้ใช้งานได้สะดวกง่ายดาย เพราะสามารถทำงานแบบ Transparent mode คือ โมดูลทำหน้าที่เป็นตัวกลางให้ micro controller สื่อสารเชื่อมต่อกับ Server เสมือนเป็นท่อทางเดินข้อมูลเชื่อมระหว่างกัน โดยไม่จำเป็นต้องมีซอฟต์แวร์ หรือคำสั่งใดๆ

และด้วยการสื่อสารแบบอนุกรม (UART) ซึ่งเป็นมาตรฐานของ micro controller ทั่วๆไป เสริมด้วยความเร็วการรับส่งข้อมูล 1200- 115200 bps. บวกมาตรฐาน IEEE802.11 b/g มี TCP/IP Stack ในตัว จึงทำให้การเชื่อมต่อ และรับส่งข้อมูล เข้ากับระบบเน็ตเวิร์คเป็นไปได้อย่างง่ายดายโดยไม่ต้องเสียเวลาเรียนรู้การใช้งานโมดูล

ด้วยประสิทธิภาพที่ได้รับการปรับปรุงขึ้นจากรุ่นก่อน จึงทำให้โมดูลนี้เหมาะสำหรับนักพัฒนา Embedded มากยิ่งขึ้น โดยมีคุณสมบัติเด่นๆ ดังนี้

1. เป็นโมดูลที่ทำตัวเป็น Transparent กล่าวคือ ฝั่ง micro controller สามารถสื่อสารตรงกับเซิร์ฟเวอร์โดยไม่ต้องใช้คำสั่งใดๆไปที่ตัวโมดูล (Plug and Play)
2. การตั้งค่าเริ่มต้นทำครั้งเดียว โดยผ่าน ซอฟต์แวร์พีซี หรือ AT command
3. มี TCP/IP Stack , DHCP ภายใน
4. เปลี่ยนแปลงค่าเริ่มต้น สามารถทำได้ภายหลัง โดยใช้ Web browser เพราะโมดูลมี Web server เฉพาะเพื่อการ Configuration บรรจุอยู่
5. อัตราการส่งข้อมูลสูงสุด 11 KBytes/s. (115,200 bps.)

การประยุกต์ใช้งาน

1. เครื่องรูดบัตรเครดิต ผ่านระบบ WiFi
2. เครื่องทำธุรกรรมการเงินผ่านระบบเน็ตเวิร์ค เช่น เครื่องจำหน่ายสินค้าแบบไร้สาย (POS)
3. อุปกรณ์ไร้สายในอุตสาหกรรม เช่น เครื่องนับจำนวนผลิตแบบไร้สาย , เซ็นเซอร์อุณหภูมิไร้สาย , เครื่องแจ้งข้อมูลอัตโนมัติแบบไร้สาย ฯลฯ

2. คุณสมบัติ (SPECIFICATION)

คุณสมบัติของระบบไร้สาย

1. มาตรฐาน IEEE 802.11 b/g
2. ความถี่ 2.412-2.484 GHz.
3. เลือกโหมดทำงานแบบ Ad hoc หรือ Infrastructure
4. มาตรฐานความปลอดภัย Authentication

   WEP64/WEP128/TKIP/CCMP(AES)

   WEP/WPA-PSK/WPA2-PSK
5. ค้นหาสัญญาณเครือข่ายและเชื่อมต่ออัตโนมัติ

การต่อเชื่อม

1. ขาเชื่อมต่อเป็นแบบ 2 x 4 pin : HDR254M-2X4
2. Baud rate 1200- 115200 bps.
3. มี RTS/CTS เป็น Flow Control หรือ ไม่ใช้ก็ได้
4. ไฟเลี้ยง 3.3 โวลต์

คุณสมบัติอื่นๆ

1. สนับสนุนโปรโตคอล TCP/UDP/ARP/ICMP/DHCP/DNS/HTTP
2. สนับสนุนการทำงาน 2 โหมด คือ โหมดกำหนดค่าติดตั้ง และ โหมดทำงานรับส่งข้อมูล
3. เชื่อมโยงระหว่างผู้ใช้และ Server แบบ Transparent
4. การกำหนดค่าติดตั้งทำได้ 3 แบบ

   4.1 ผ่าน Serial port ด้วยโปรแกรม Wii3-Config.exe บนคอมพิวเตอร์

   4.2 ผ่าน Serial port ด้วย AT+ command

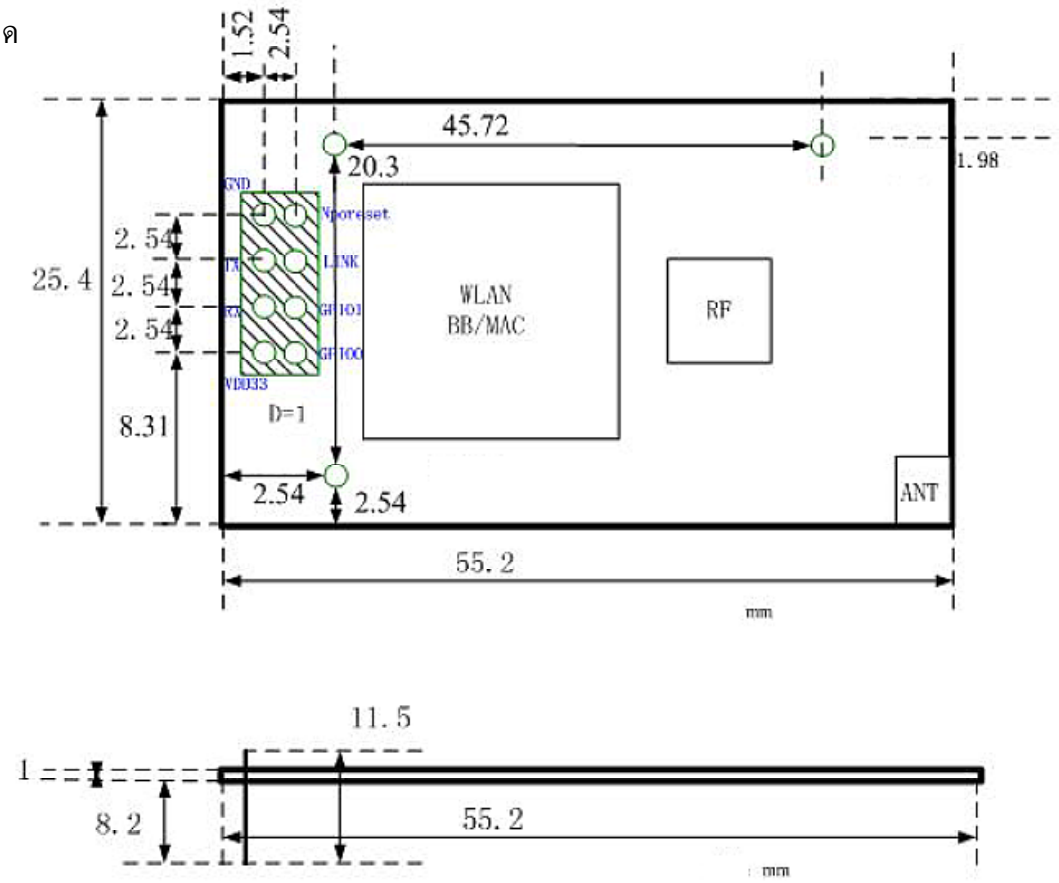
   4.3 ผ่าน Web Browser (เพื่อการแก้ไขเพิ่มเติม หลังจากที่กำหนดค่าติดตั้งเรียบร้อย)

คุณสมบัติทางเทคนิคของ TNS-Wii3

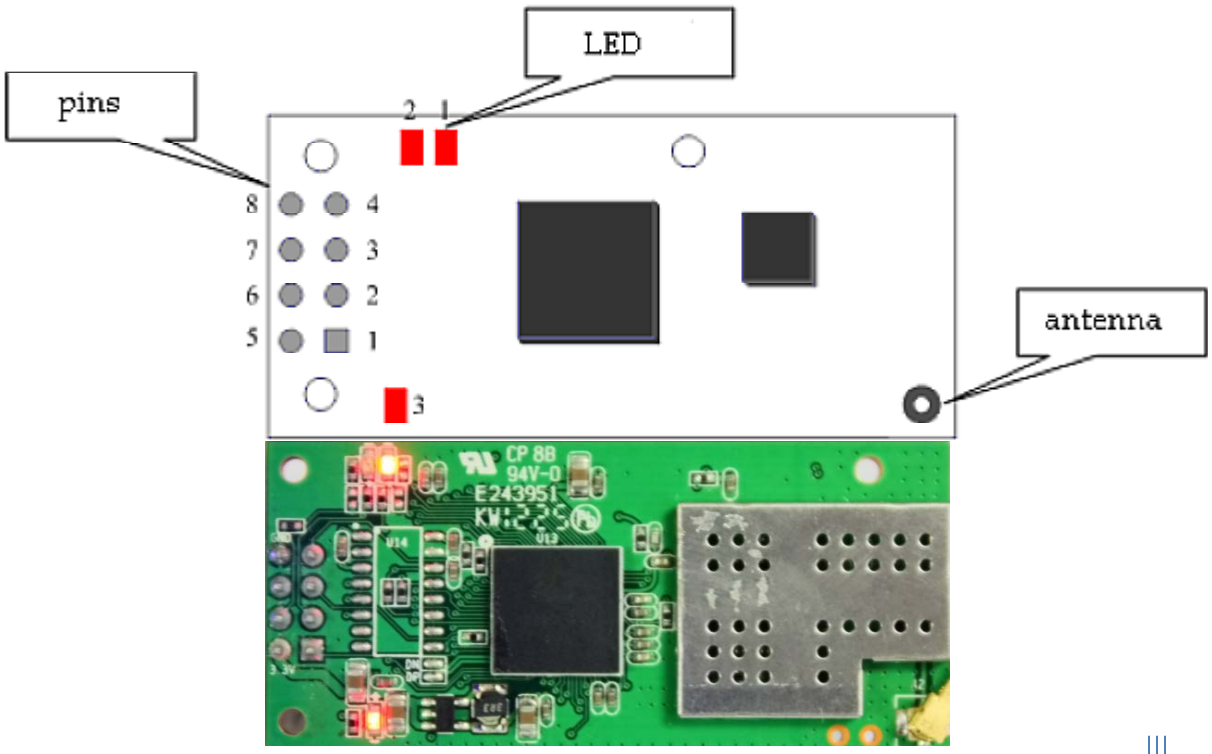
	Item	Parameters
Wireless	Wireless standard	IEEE 802.11 b/g
	Frequency range	2.412 -2.484 GHz.
	Receiver Sensitivity	802.11b : -86 dBm (typical) 802.11g : -71 dBm (typical)
	Modulation	DSSS,OFDM,DBPSK,DQPSK,CCK,QAM16/64
	Output power	802.11b : 18 ± 2 dBm (typical) 802.11g : 15 ± 1 dBm (typical)
	Antenna Interface	IPX
Hardware	Serial type	UART
	Serial baud rate	1200-115200 bps
	Operating Voltage	3.3 ± 0.3 V.
	Operating Current	300 mA (typical)
	Storage Temperature	-40 to +85 □C
	Operating Temperature	0 to +75 □C
	Dimensions	55.2 x 25.4 x 11.5 mm.
	Environment certification	RoHS
Software	Network type	Infra/Adhoc
	Security	WEP/WPA-PSK/WPA2-PSK
		WEP64/WEP128/TKIP/CCMP(AES)
	Mode	Automatic / Command
	Serial command	AT+ for Configuration setting
	Network protocol	TCP/UDP/ARP/ICMP/DHCP/DNS/HTTP
	Maximum sockets connection	15
	Maximum TCP connection	Client : 8 Server: 3-4
	Maximum UDP connection	5-6

3. ฮาร์ดแวร์ (HARDWARE)

3.1. ขนาด



3.2. ขาที่ใช้เชื่อมต่อ



ตำแหน่งขาเชื่อมต่อสัญญาณ

ขาที่	Function	direction	description
1	nRTS/nREADY/LED1	O	เป็นขา RTS <u>และแสดง สถานะ ด้วยLED1</u> สถานะ <u>ดับ</u>: *ต่อเน็ตเวิร์คสำเร็จ* /Ready สถานะ <u>ติด</u> : *ไม่ได้ต่อกับเน็ตเวิร์ค*
2	nCTS/MODE/GPIO/LED2	i/O	<u>โหมดทำงาน</u> : เป็นขา CTS <u>โหมดตั้งค่า</u>: หลังรีเซ็ทภายใน 300 mS ถ้าป้อน High สู่การ config ถ้าป้อน Low/ลอย โหมดปกติ Input/output : เป็นพอร์ตใช้งานอเนกประสงค์
3	Link /LED3	O	กระพริบแสดง Auto Work mode หรือ Scan
4	nRESET	i	ป้อน Low เพื่อรีเซ็ท
5	**VDD**	i	ป้อนไฟตรง + 3.3 V
6	**RXD**	i	ขารับข้อมูลแบบอนุกรม
7	**TXD**	O	ขาส่งข้อมูลแบบอนุกรม
8	**GND**	I	กราวนด์

หมายเหตุ ขา 1-4 หากไม่ใช้งาน ให้ปล่อยลอยไว้

4. ขั้นตอนเริ่มใช้งานแบบรวดเร็ว(QUICK START)

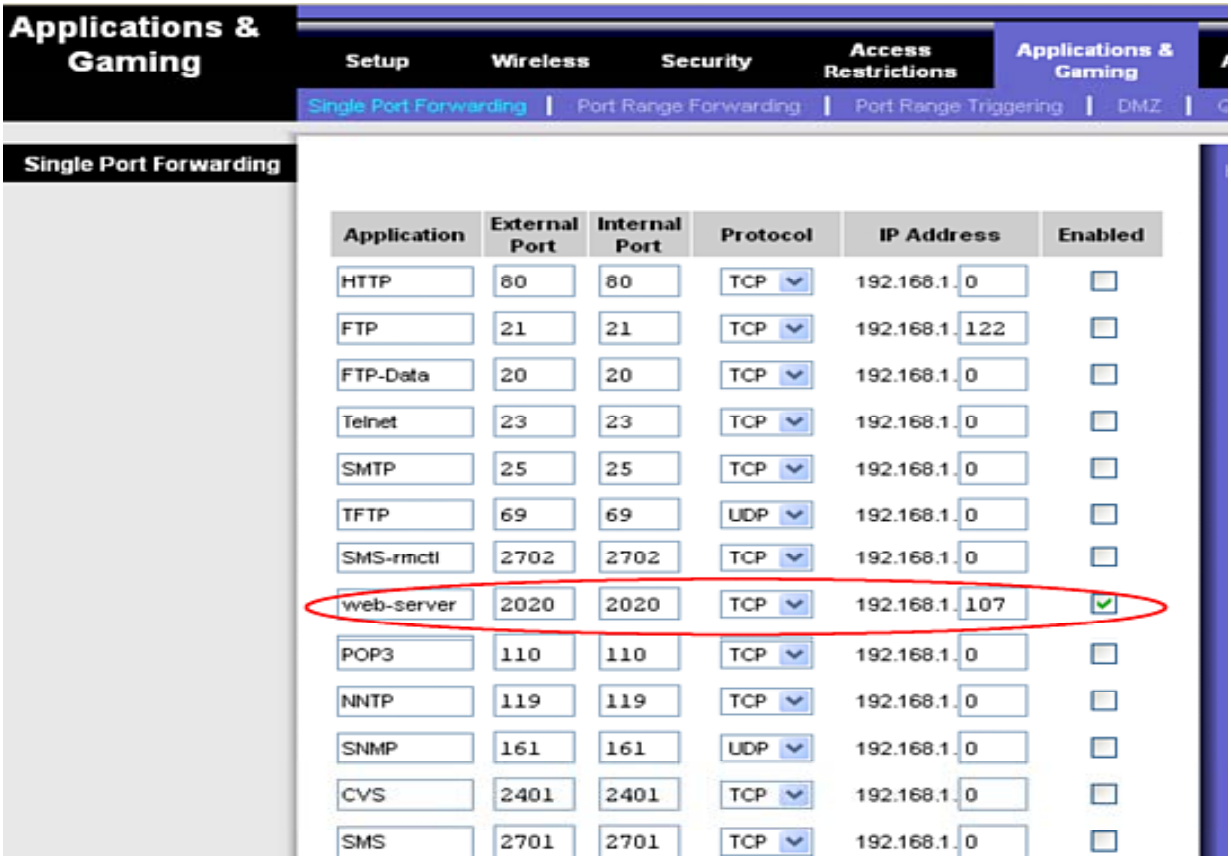
1. เตรียมอุปกรณ์ ฮาร์ดแวร์
   1.1 โมดูล TNS-Wii3
   1.2 ตัวแปลงพอร์ต USBเป็นอนุกรม USB-TTL-S หรืออื่นๆ

2. ซอฟต์แวร์
   2.1 Wii3-config.exe
   2.2 โปรแกรมสื่อสารแบบอนุกรม (Serial)เช่น Hyper terminal เพื่อทดสอบการรับส่งข้อมูล
   2.3 โปรแกรมเซิฟเวอร์ /ไคลเอนต์ เช่น TCP Test Tool และ UDP Test Tool
   2.4 Driver ของ USB-TTL-S

3. การตั้งค่าไอพี และ ค่าเริ่มต้นอื่นๆ ของโมดูลผ่านพอร์ตอนุกรม

3.1 หากต้องการเป็นโหมด Server เพื่อให้ Clientสามารถผ่าน Firewall เข้ามาได้ ให้เพิ่มเลขไอพี และเบอร์พอร์ตฟอร์เวิร์ด เริ่มต้นโดยเปิด Web browser เข้าไปหน้าแอดมินของ Access point /Router พิมพ์192.168.1.1 ป้อนชื่อ admin และ พาสเวิร์ด จากนั้นเข้าหน้า Application (หรือชื่ออื่นๆแล้วแต่ยี่ห้อของ Access point/router) ให้ป้อน IP ใดๆที่ไม่ซ้ำกับที่มีอยู่ เช่น 192.168.1.107 และ เบอร์ Port 2020 และประเภทเป็น Server หรืออื่นๆ และ ติ๊ก Enable Port ที่ฟอร์เวิร์ด ด้วย

*** หากไม่ต้องการเป็น Server ให้ข้าม หัวข้อ 3.1 นี้



3.2 จ่ายไฟเลี้ยง 3.3 โวลต์ เข้าที่ โมดูล TNS-Wii3 และเนื่องจากโมดูลกินกระแสประมาณ 300 มิลลิแอมป์ แนะนำให้ใช้ไอซีเรกกูเลเตอร์แบบสวิทชิ่งเช่นเบอร์ LM2575-33 เป็นต้น(แต่ถ้าใช้ USB-TTL-S จะมีภาคจ่ายไฟ 3.3 V. พร้อม)

Figure 4-1 USB-TTL-S

<u>หมายเหตุ</u> ในการใช้งานหากต้องการประหยัดไฟในกรณีเป็นโหมด Client สามารถเพิ่มวงจรตัดต่อไฟเลี้ยงโมดูลได้

3.3 เสียบ USB-TTL-S เข้ายังคอมพิวเตอร์ และ ต่อขา Rx,Tx,GND ของ USB-TTL-S หรือ ตัวแปลงสัญญาณ RS232 อื่นๆ ที่ให้สัญญาณแรงดัน **3.3 V. TTL level** โดยต่อกับขา Txd,Rxd,GND ของโมดูล Wii3 ตามลำดับ (Rx ของ USB-TTL-S ต่อกับ Txd ของโมดูล และ Tx ของ USB-TTL-S ต่อกับ Rxd โมดูล ให้สังเกตทิศทางหัวลูกศร)

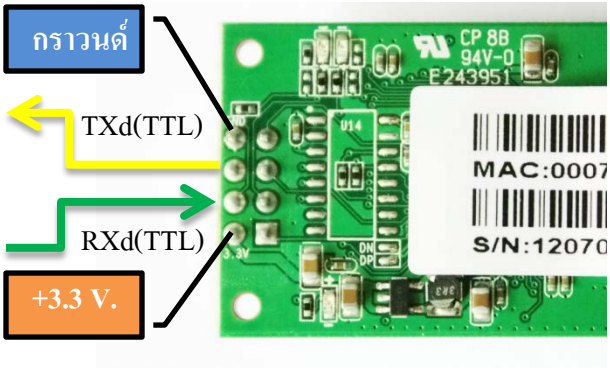


Figure 4-2 รูปแสดงการต่อ TNS Wii3 เข้ากับ USB-TTL-S ได้พอดี

3.4 เปิดโปรแกรม Wii3-config.exe

3.5 เลือก Port ให้เบอร์ตรงกับ Port ของ USB-TTL-S (ดูเบอร์ Port ใน Device Manger) หรือ Auto

3.6 ตรวจค่า default Baud rate ว่าเป็น 115200 bps. N-8-1 หรือไม่

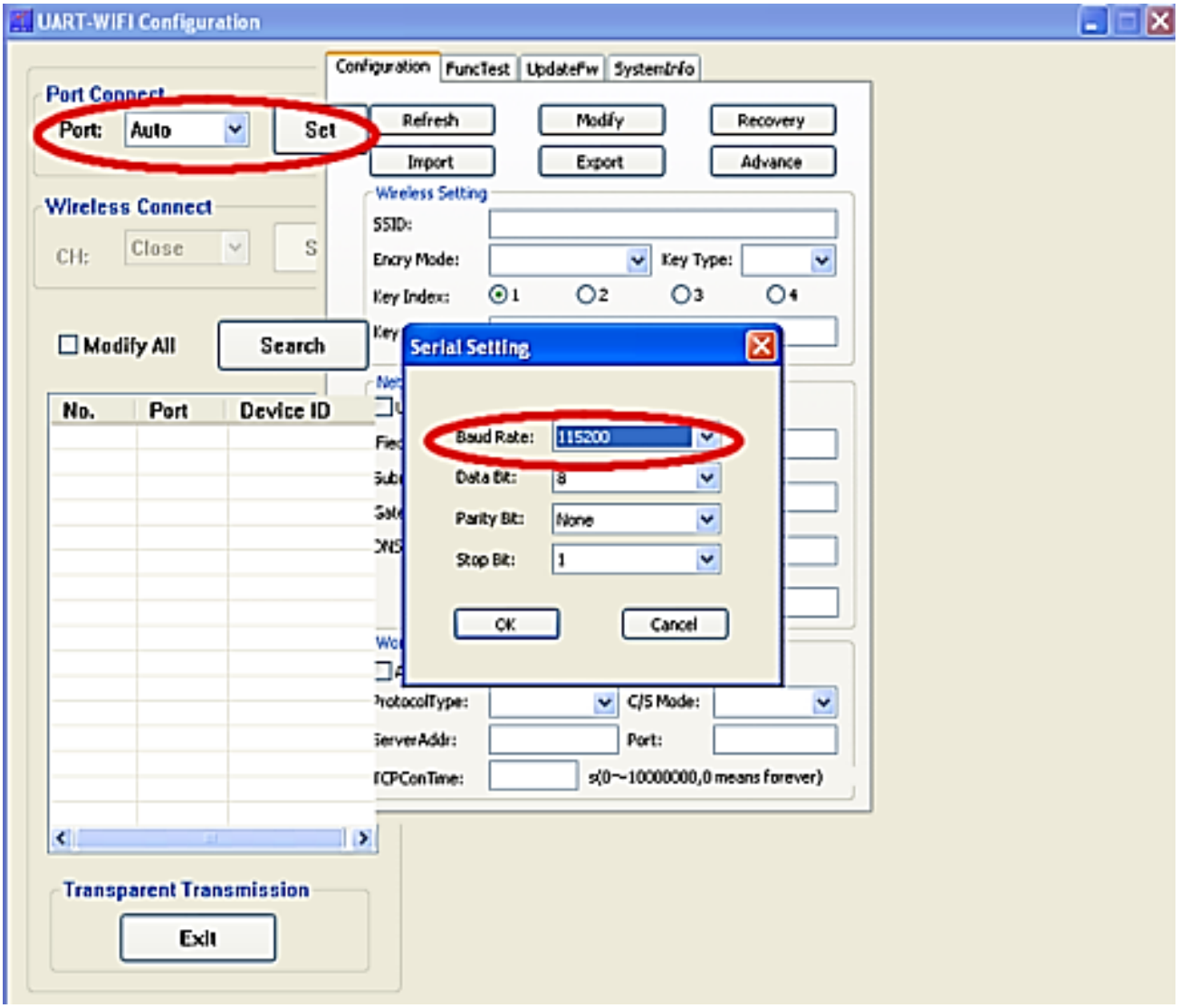
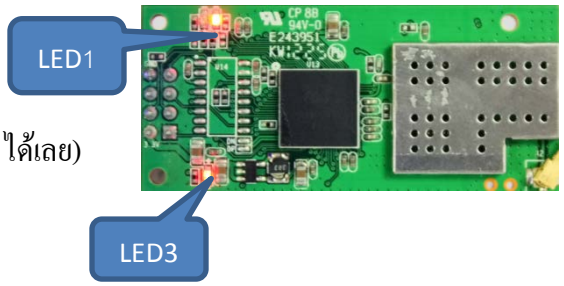


Figure 4-3 การตั้งค่า Board rate

3.7 ถ้า LED3 และ LED1 ดับทั้งคู่ ให้รีเซ็ทโมดูล (Low ขา 4)



ก่อน (ถ้าใช้ USB-TTL-S กดปุ่ม Reset บน USB-TTL-S ได้เลย)

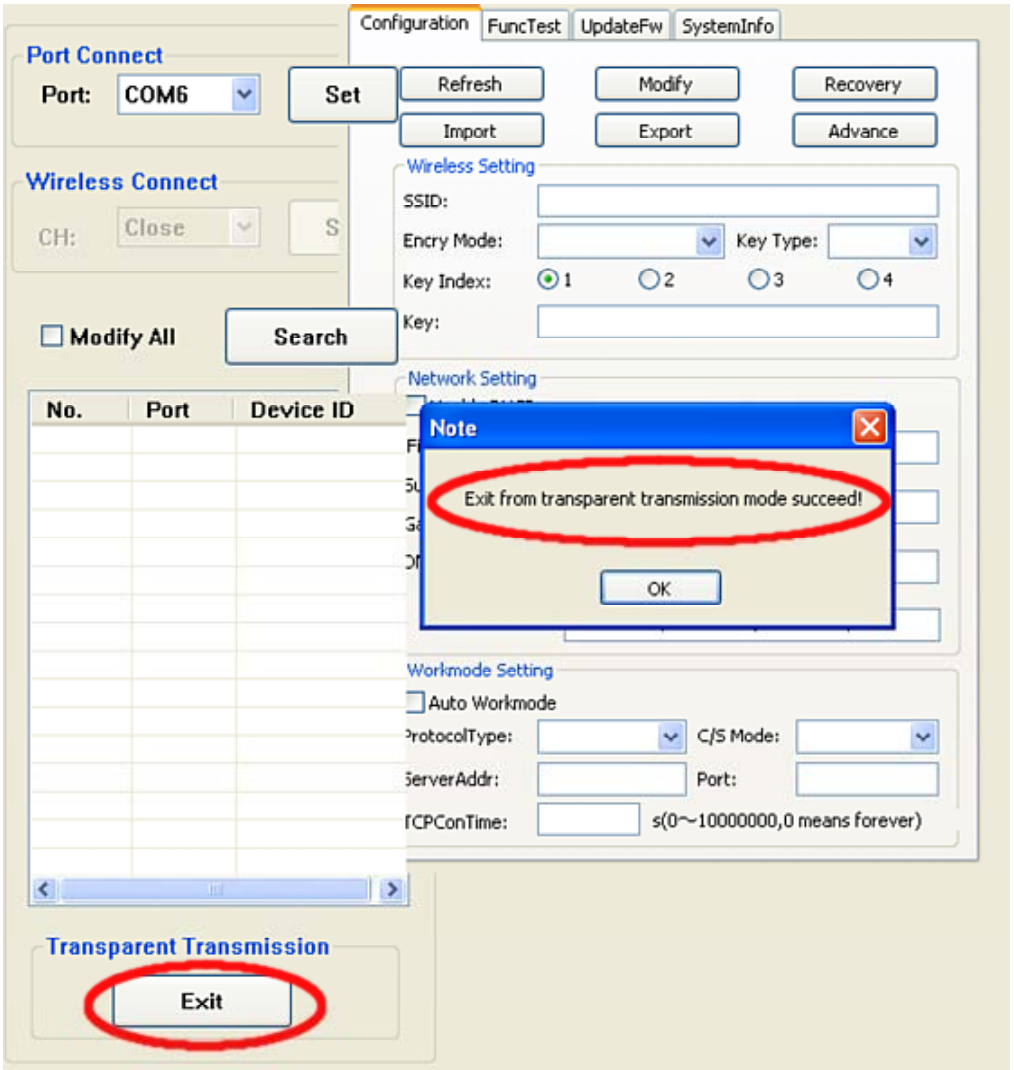
จากนั้นสังเกตเฉพาะ LED3

ถ้า LED3 ดับ ให้ คลิกปุ่ม Search แล้วไปที่หัวข้อ 3.8

แต่ถ้า LED3 กระพริบ ให้ คลิกปุ่ม Exit

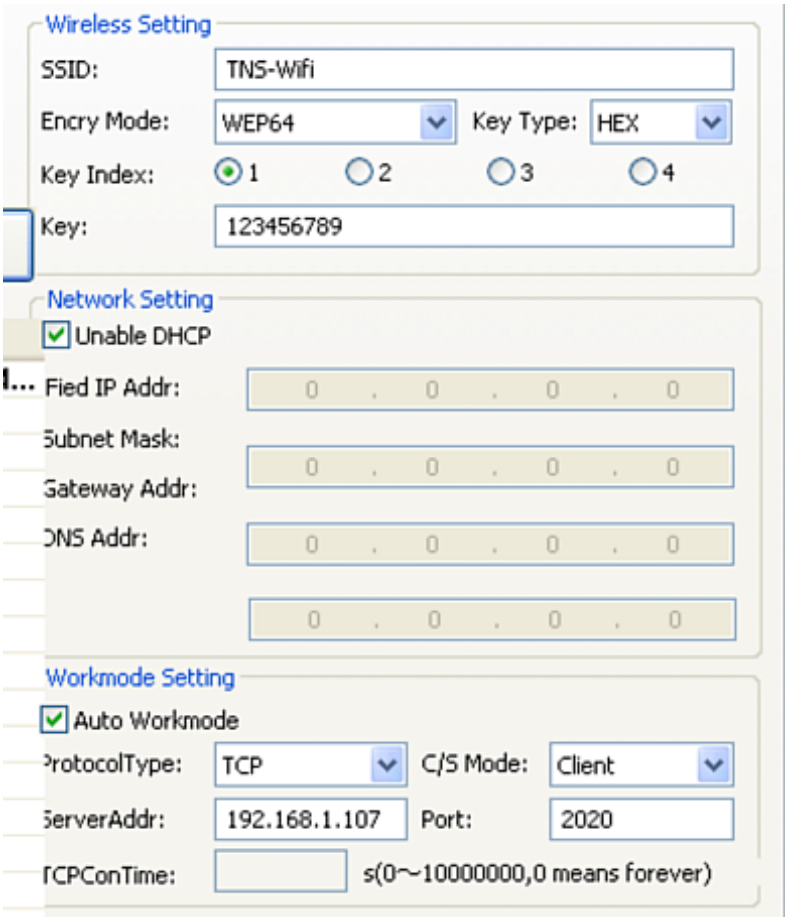
ถ้าหากโมดูลตอบสนองกับซอฟต์แวร์ จะขึ้นประโยคว่า

“ Exit from transparent transmission mode succeed !”



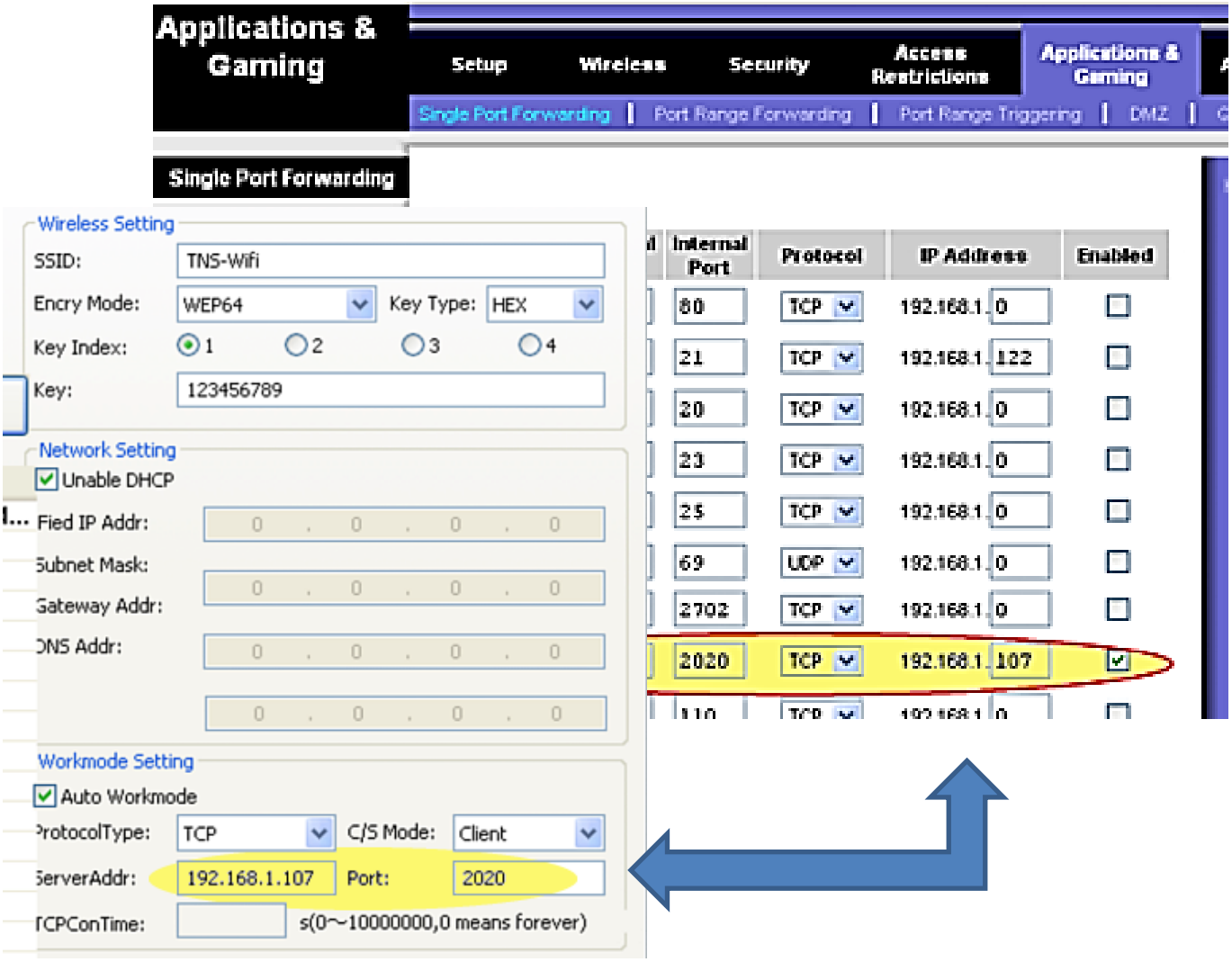
3.8 คลิกปุ่ม Search หาก baud rate และ port ถูกต้อง ในช่องว่างถัดลงมา จะมีเลข ID ของโมดูล ปรากฏขึ้นมา

3.9 ให้ป้อน SSID ซึ่งคือชื่อของ Access point/ Router , ชนิดของการเข้ารหัส (Encrypted Mode) , ชนิดของรหัส (Hex / ASCII) , รหัส password , ติ๊กเครื่องหมายถูกที่ช่อง Unable DHCP , ติ๊กถูกที่ Auto working mode (ข้อมูลเหล่านี้ สอบถามได้จาก Admin ของระบบ) และ prototype= TCP, C/S mode = Client

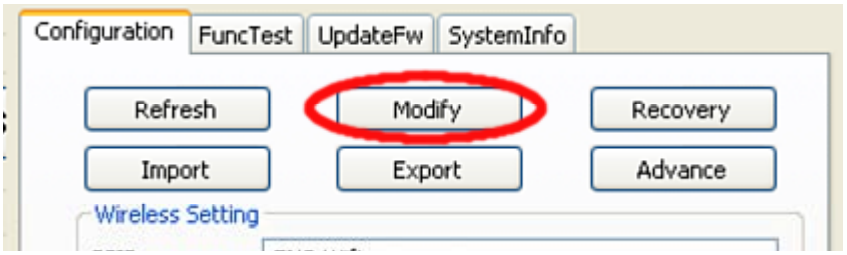


<u>หมายเหตุ</u> กรณีที่ต้องการเปลี่ยนชื่อ SSID หรือ Encrypt ต้องรีเซ็ทค่าในโมดูลด้วยการคลิกปุ่ม Recovery รอสักครู่ แล้วตามด้วย Refresh คลิก Search จะเห็น SSID มีค่า Default จึงจะเปลี่ยนชื่อ SSID อันใหม่ได้

3.10 ป้อนเลขไอพีและ Port ในโมดูล ให้ตรงกับค่าที่กำหนดไว้แล้วใน Access Point / Router



3.11 คลิกปุ่ม Modify



3.12 หากทุกอย่างถูกต้อง จะมีข้อความปรากฏออกมา

3.13 คลิกปุ่ม Reset Now หากไม่สำเร็จให้คลิกปุ่ม Recovery แล้วทำขั้นตอนที่ 3.6 ใหม่ หรือตั้งแต่ต้น

3.14 ปิดโปรแกรม Wii3-Config ดึงไฟจ่ายโมดูล TNS-Wii3 ออก แล้วเสียบใหม่

3.15 เปิดโปรแกรม TCP Test Tool และตามด้วยโปรแกรม Hyper terminal

3.16 ทดลองพิมพ์ส่งข้อความใน Hyperterminal จะเห็นข้อความปรากฏขึ้นมาใน TCP Test Tool

และถ้าป้อนข้อความจาก TCP Test Tool send ออกไป ก็จะเห็นข้อความปรากฏขึ้นใน Hyperterminal

5. เพิ่มเติมระบบเน็ตเวิร์ค(NETWORK SYSTEM)

ในระบบ WiFi มีการเชื่อมต่อได้ 2 วิธีคือ แบบ Adhoc และ Infrastructure

5.1. แบบ Infrastructure ประกอบด้วย AP และ STA

AP = Access Point คือจุดกำเนิดสัญญาณไร้สายของเน็ตเวิร์ค และเป็นจุดศูนย์กลางของระบบ ซึ่งก็คือ Wireless router ที่ใช้กันตามสำนักงาน หรือ บ้าน

STA=Station หมายถึงอุปกรณ์ที่เชื่อมเข้าระบบเน็ตเวิร์ค เช่น เครื่อง Notebook , PDA , ฯลฯ

เน็ตเวิร์ค แบบ Infrastructure จะประกอบด้วย AP(access point) และ STA หลายๆตัว โดยที่ STA ทุกๆตัวต้องสื่อสารผ่าน AP

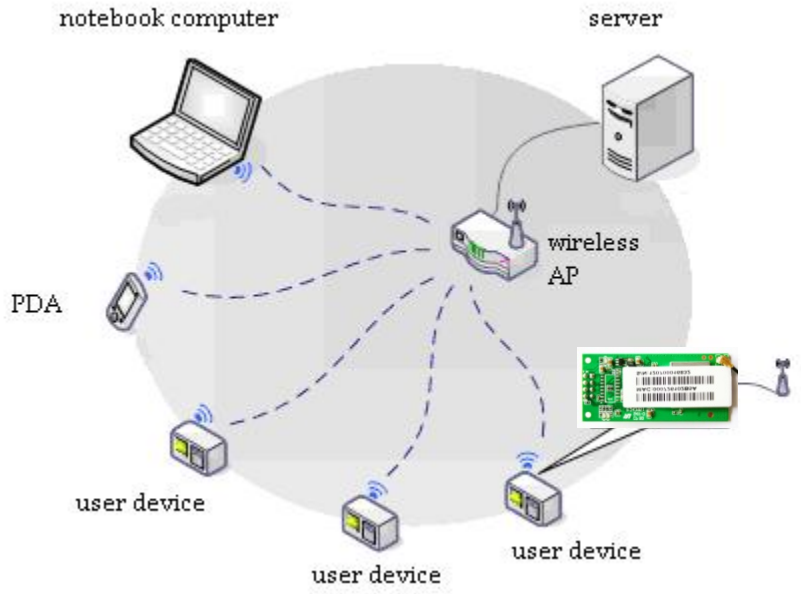


Figure 5-1 รูปแสดงเน็ตเวิร์คแบบ Infrastructure

5.2.แบบ Adhoc

เป็นระบบเน็ตเวิร์คที่มีเพียงแต่ STA สองตัวขึ้นไปเชื่อมต่อสื่อสารกันเองโดยตรง โดยไม่จำเป็นต้องมี AP

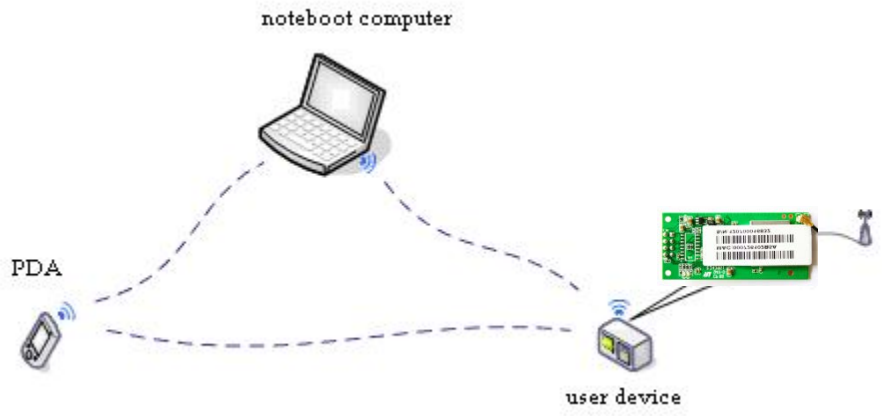


Figure 5-2 รูปแสดงเน็ตเวิร์คแบบ Adhoc

โมดูล TNS-Wii3 สนับสนุนการเชื่อมต่อทั้ง 2 คือแบบ Infrastructure และ Adhoc

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6. ตัวอย่างการประยุกต์ใช้งาน (APPLICATIONS)

6.1. ให้ TNS-Wii3 เป็น Client รับส่งข้อมูลในวงเน็ตเวิร์ค หรือผ่านอินเตอร์เน็ตต่อกับ Server ภายในหรือ Serverภายนอก

การทำงานชนิดนี้เป็นการสื่อสารข้อมูลระหว่างอุปกรณ์ในโรงงานหรือสำนักงานกับเซิฟเวอร์ภายในวงเน็ตเวิร์ค หรือนอกวงโดยผ่านอินเตอร์เน็ต โดยที่อุปกรณ์เหล่านี้ เป็นฝ่ายส่งข้อมูลไปยังเซิฟเวอร์ก่อน ยกตัวอย่างเช่นเครื่องขายสินค้า(POS)ที่ต้องการรายงานสินค้าที่ขายไป,จำนวนที่เหลือ, จำนวนเงิน , ข้อมูลเหตุการณ์ต่างๆ ที่สำคัญ ไปยังเซิฟเวอร์ หรือ กรณีเซ็นเซอร์ต่างๆ ที่เน้นเรื่องเหตุการณ์สำคัญๆ หรือ เหตุวิกฤติ (critical)โดยที่ตัว POS.หรือเซ็นเซอร์ ทำงานเป็น **Client** **เป็นฝ่ายเริ่ม** ติดต่อกับเซิฟเวอร์ โดยผ่าน Access Point ในบริเวณนั้น

ลักษณะการต่อเชื่อมสัญญาณ

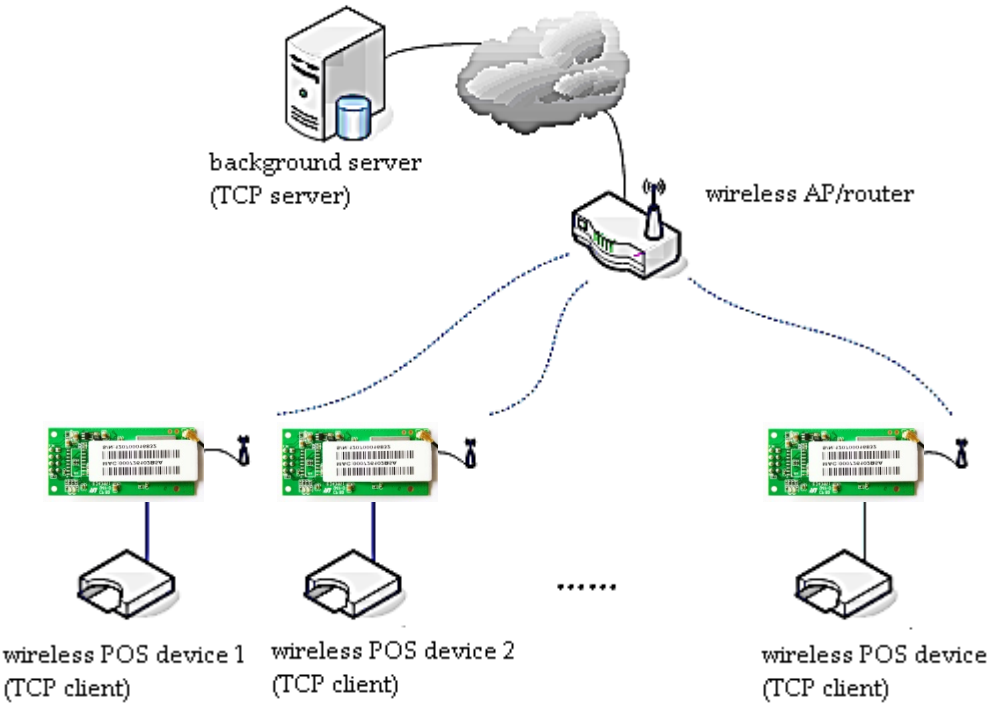

Figure 6-1 การรับส่งข้อมูลระหว่าง Client กับ Server ผ่านอินเตอร์เน็ต

*ตัวอย่างการตั้งค่า **Config***

Wirelss POS machine X

- Wireless setting
  - ตั้งค่า SSID , encryption mode , key และอื่นๆ เหมือนค่าใน Access Point
- Network setting
  - *Enable DHCP*
- Work mode setting
  - *Enable auto-work mode*
  - Protocol type: *TCP*
  - C/S mode: *client*
  - Server address: กำหนดหมายเลขไอพีแอดเดรส (IP) ของเซิฟเวอร์เช่น 192.168.0.100 หรือ www.xyz.com
  - Port number: กำหนดหมายเลขของพอร์ตของเซิฟเวอร์ ที่กำหนดไว้ในฝั่งเซิฟเวอร์ เช่น 2020 แต่หากเซิฟเวอร์เป็นเวบไซต์แบบ HTTP ให้กำหนดหมายเลขพอร์ตเป็น 80

6.2. ให้ TNS-Wii3 เป็น Server รับส่งข้อมูลผ่านวงเน็ตเวิร์คภายในหรือผ่านอินเตอร์เน็ตกับ Client

การทำงานชนิดนี้เป็นการรับส่งข้อมูลระหว่างอุปกรณ์ภายในวงเน็ตเวิร์ค หรือภายนอกผ่านอินเตอร์เน็ต โดยที่อุปกรณ์เหล่านี้อยู่ในสภาพ **เตรียมพร้อมรอการดึงข้อมูลจาก** เซิฟเวอร์ ยกตัวอย่างเช่น การอ่านค่าเซ็นเซอร์ต่างๆในโรงงานหรือสำนักงาน โดยที่ทางภายนอกเป็นฝ่ายร้องขอข้อมูลเข้ามาหาที่ตัวเซ็นเซอร์เป็นระยะๆ เพื่อให้ได้ข้อมูลที่ updated ดังนั้นฝั่งภายนอกจึงเป็น Client ส่วนเซ็นเซอร์ต่างๆจะเป็น Server

ลักษณะการต่อเชื่อมสัญญาณ

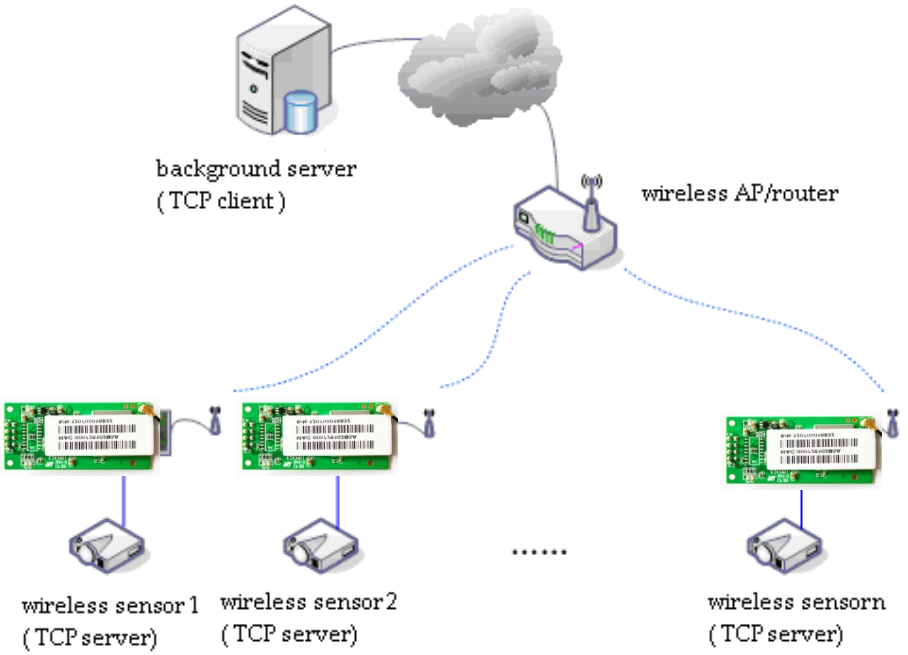

Figure 6-2 ภาพแสดงการเป็นเซิฟเวอร์ของเซ็นเซอร์ รอให้ภายนอกเป็นฝ่ายดึงข้อมูลออกไปจากเซ็นเซอร์

Reference setting

Wireless sensor X

- Wireless setting
  - ตั้งค่า SSID , encryption mode , key และอื่นๆ เหมือนค่าใน Access Point
- Network setting **ใช้ Enable DHCP ไม่ได้**
  - IP address: 192.168.0.X
  - Subnet mask: 255.255.255.0
  - Gateway address: 192.168.0.1
  - DNS address: 192.168.0.1
- Work mode setting
  - Enable auto-work mode
  - Protocol type: TCP
  - C/S mode: server
  - Port number ： 6000
  - Connection timeout ： 120s

6.3. ให้ TNS-Wii3 ดึงข้อมูลจากอุปกรณ์ต่างๆในระบบแบบ RS 485 ในอุตสาหกรรม

เป็นการทดแทนระบบสื่อสารเดิม RS485/422 หรือ เดินระบบใหม่ให้เป็นระบบไร้สาย วิธีนี้ทำได้โดยให้ตั้งเป็นแบบ UDP และตัว Wifi ที่ศูนย์กลางเก็บข้อมูลจะเป็น server ส่วนตัวอื่นๆในระบบที่ส่งข้อมูลเข้าศูนย์กลางจะเป็น Client การเชื่อมต่อแบบนี้ อุปกรณ์ต่างๆในระบบ หรือ ซอฟต์แวร์ต่างๆที่ใช้ ไม่ต้องมีการดัดแปลงแก้ไขหรือเปลี่ยนแปลงใดๆทั้งสิ้น สามารถต่อแทนที่ระบบเดิมได้อย่างสมบูรณ์แบบ Plug and Play

ลักษณะการต่อเชื่อม เปรียบเทียบกับ การต่อแบบ **RS 485** ในอุตสาหกรรม

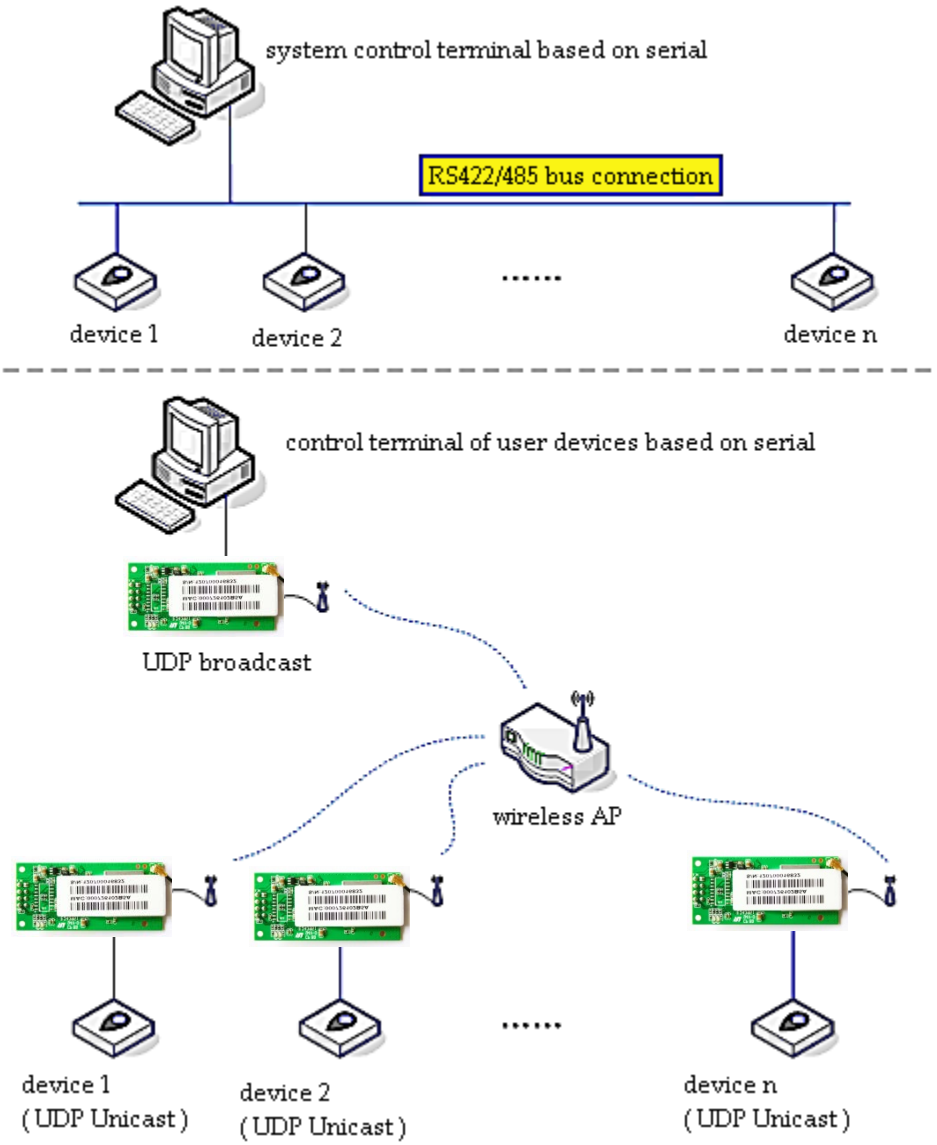

Figure 6-3 ภาพการต่อเป็น RS 485 แบบไร้สาย

Reference setting

Control terminal of device

- Wireless setting
  - ตั้งค่า SSID , encryption mode , key และอื่นๆ เหมือนค่าใน Access Point
- Network setting
  - IP address: 192.168.0.Y
  - Subnet mask: 255.255.255.0
  - Gateway address: 192.168.0.1
  - DNS address: 192.168.0.1
- Work mode setting
  - Enable auto-work mode
  - Protocol type: **UDP**
  - C/S mode: Server (broadcast)
  - Port number: 6000
  - Connection timeout: 0

Device X

- Wireless setting
  - ตั้งค่า SSID , encryption mode , key และอื่นๆ เหมือนค่าใน Access Point
- Network setting **ใช้ Enable DHCP ไม่ได้**
  - IP address: 192.168.0.X
  - Subnet Mask: 255.255.255.0
  - Gateway address: 192.168.0.1
  - DNS address:192.168.0.1
- Work mode setting
  - Enable auto-work mode
  - Protocol type: **UDP**
  - C/S mode: Client (unicast)
  - Port number: 6000
  - Connection timeout: 0

6.4. การต่อแบบไร้สายเชื่อมระหว่างกัน โดยไม่ต้องใช้ AP หรือ Router (ADHOC)

ลักษณะการต่อเชื่อมสัญญาณ

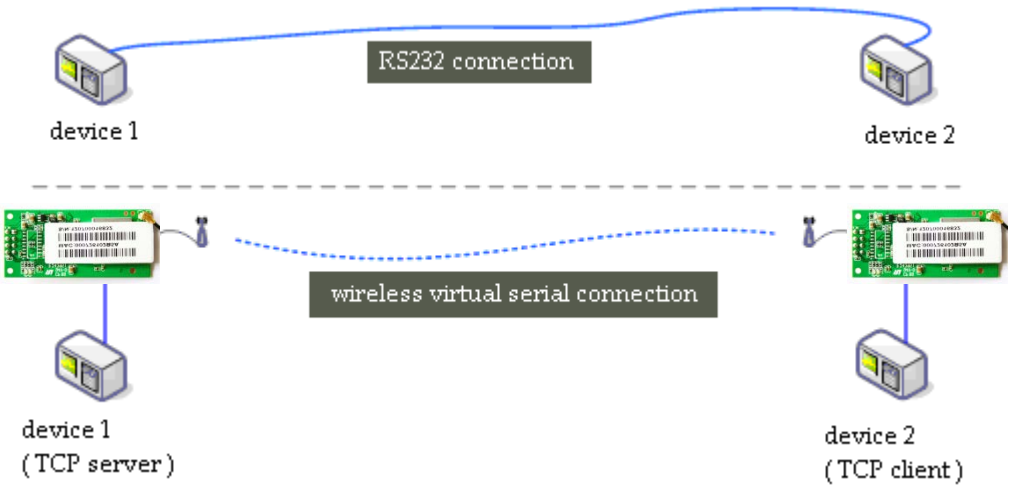

Figure 6-4 Wireless virtual serial

Reference setting

Device 1

- Wireless setting
  - Network mode: adhoc,and enable “Create adhoc when network does not exist”
  - SSID: my_adhoc
  - Encryption mode: open
  - Others is default
- Network setting
  - IP address: 192.168.0.1
  - Subnet Mask: 255.255.255.0
  - Gateway address: 192.168.0.1
  - DNS address:192.168.0.1
- Work mode setting
  - Enable auto-work mode
  - Protocol type: TCP
  - C/S mode: server
  - Port number ： 6000
  - Connection timeout ： 0

Device 2

- Wireless setting
  - Network mode: adhoc
  - SSID: my_adhoc
  - Encryption mode: open
  - Others is default
- Network setting **ใช้ Enable DHCP ไม่ได้**
  - IP address: 192.168.0.2
  - Subnet Mask: 255.255.255.0
  - Gateway address: 192.168.0.1
  - DNS address:192.168.0.1
- Setting of work mode
  - Enable auto-work mode
  - Protocol type: TCP
  - C/S mode: client
  - Port number ： 6000
  - Server address:192.168.0.1

6.5. การต่อผสมเป็นทั้ง Server และ Client (Multi-network connection)

เป็นรูปแบบที่ตัวแม่ข่ายทำหน้าที่ได้ทั้ง Server และ Client โดยการใช้คำสั่ง AT Command (ไม่ใช่ Auto work mode) โดยการเปิด Socket เพื่อการเชื่อมต่อ 4 จุด เป็นชนิด Server 2 จุด และ Client 2 จุด

ลักษณะการต่อเชื่อมสัญญาณ

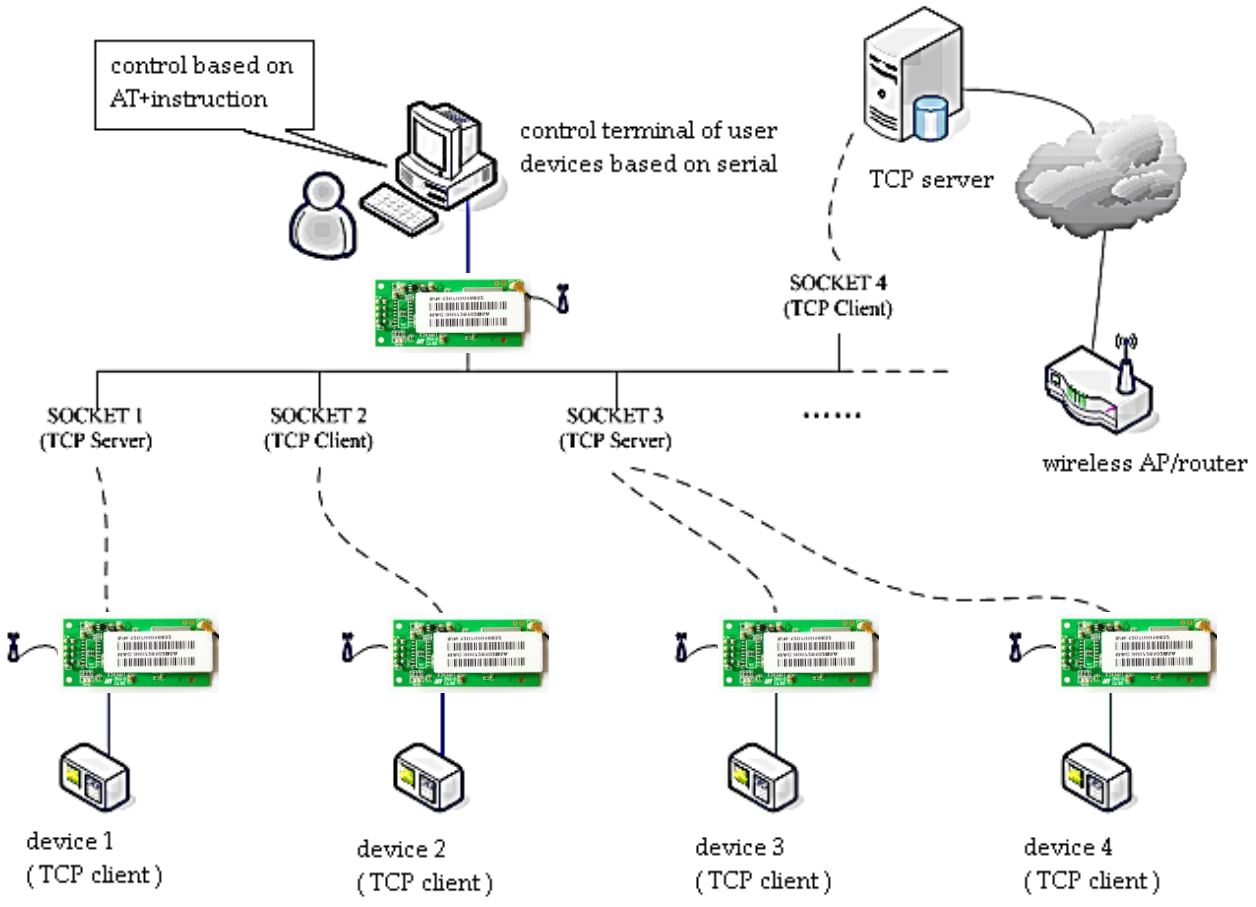

Figure 6-5 Multi-network connection mode

สำหรับโหมดนี้ผู้ใช้จำเป็นต้องศึกษาคำสั่ง AT Command ในคู่มืออย่างละเอียด

Reference setting

Device control terminal

- Wireless setting
  - SSID,encryption mode,key and so on(refer to the setting of wireless AP or router)
- Network setting
  - IP address: 192.168.0.X
  - Subnet Mask: 255.255.255.0
  - Gateway address: 192.168.0.1
  - DNS address:192.168.0.1
- Work mode setting
  - Disable auto-work mode

7. HARDWARE CONNECTION

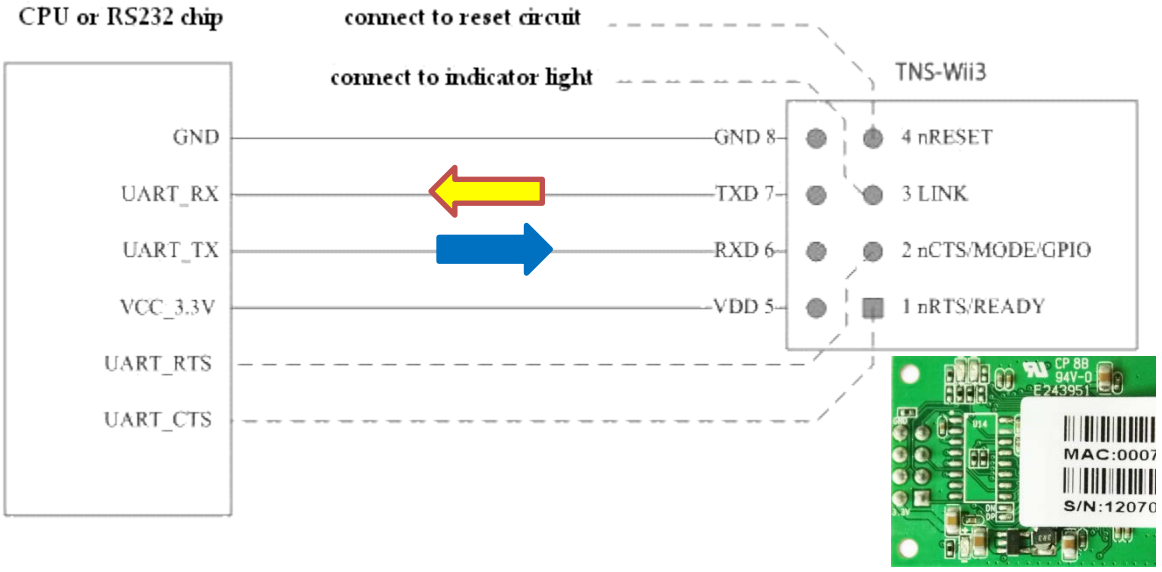

Figure 7-1 Hardware Connection

TNS-Wii3 module provides 8-pin dual in-line, the lateral row pins (5 ~ 8) must be connected, as shown above, row pins (1 ~ 4) are optional feature pins, connection as shown above. If they are not used, you can leave the corresponding pins vacant. .

7.1.Work mode

7.1.1. Start-up mode selection

Multi-functional pins nCTS/MODE/GPIO(pin 2) is used to select start-up mode at the power-on and reset phase, timing is shown below.

✧ Normal startup mode

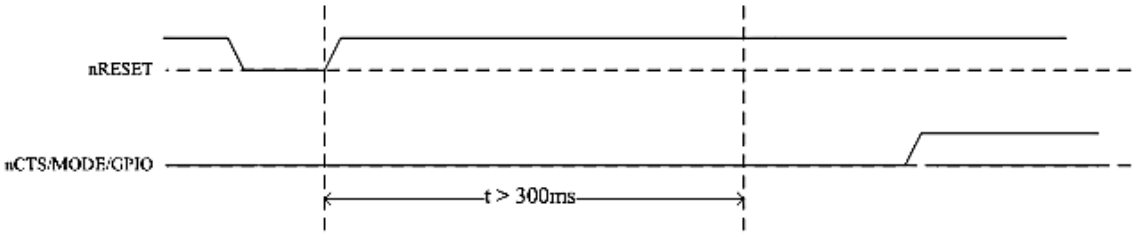

Figure 7-2 Normal startup mode

nCTS/MODE/GPIO pin has an internal pull-down, when it's disconnected module will enter normal startup mode automatically.

In the normal startup mode the system runs according to the default work mode(auto or command) in the parameters.

✧ launching configuration mode

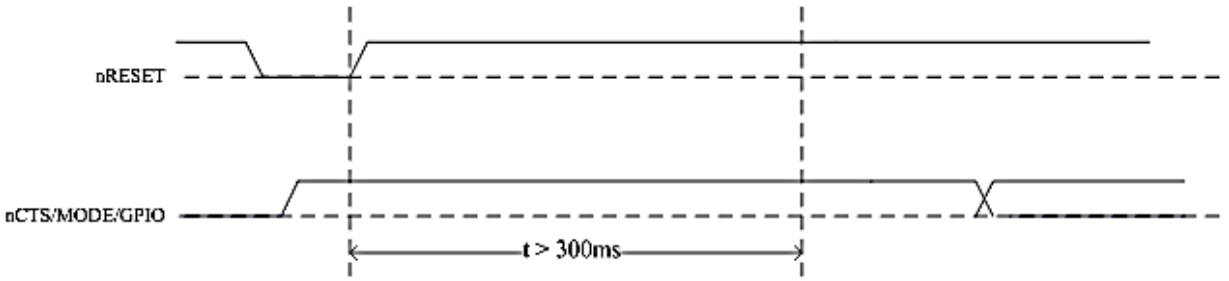

Figure 7-3 launching configuration mode

In launching configuration mode, the system ignores the default work mode parameters, and force to operate in the AT+Instruction mode, this mode is commonly used to modify the parameters with the configuration management program and do the function tests.

7.1.2. Auto-work mode

The module supports auto-work mode, and it really achieves a serial plug and play, it reduces user complexity furthest. In this mode user should only configure the necessary parameters. After power is on each time, module can automatically connect to the default wireless network and server. As in the automatic mode, the module's serial always work in the transparent transmission mode, so users only need to think of it as a virtual serial cable, and send and receive data as using a simple serial. In other words, the serial cable of users' original serial devices is directly replaced with the module. user equipment can be easy for wireless data transmission without any changes.

7.1.2.1. Automatic retry mechanism

In auto-work mode, the connection of the system runs completely and automatically, and its working process is shown below:

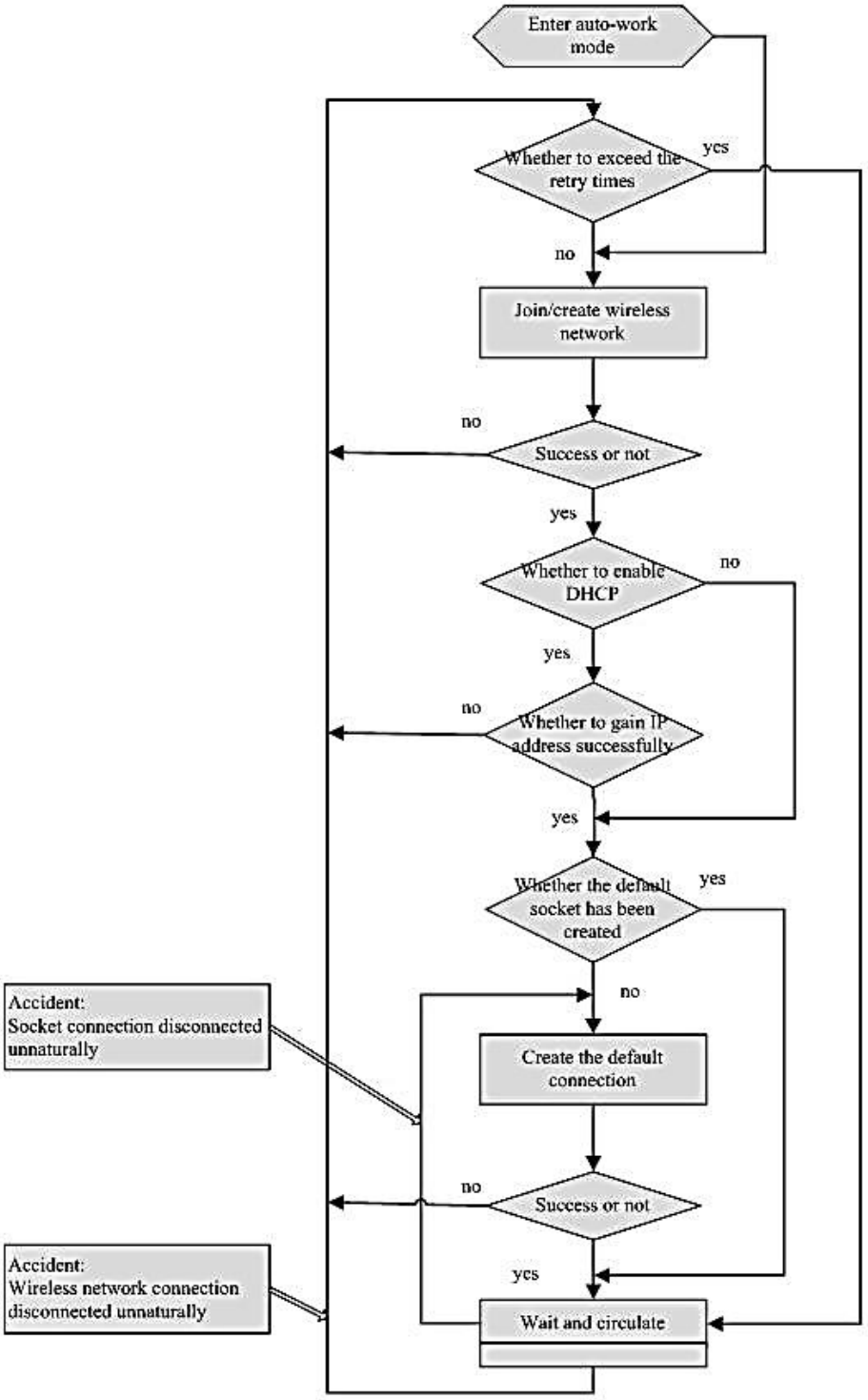

Figure 7-4 Automatic retry mechanism

Note：

1) *the default Automatic retry time of the system is set to forever, this means system will retry to connect when the networking is failed or network is disconnected. Users can also set a limited number of retries value in this case, once the retry number is over the limit the system will try to reconnect any more, except resetting the system;*
2) *Socket connection (here especially means TCP connection) is a virtual connection in the case of non-normal disconnection of the wireless network, the original Socket connection will not be deleted, and restored when the wireless network connection is resumed;*

7.1.2.2. Auto framing system

In transparent transmission mode, all data in the serial transfers in the form of byte stream and in the network, the data transfers at a fixed frame format, therefore, the data between the serial and network need a conversion process between a stream and a frame.

For the data transmission in the direction from the network to the serial data conversion from a frame into a stream is very easy. but in the contrary direction, that is data is converted from the stream to frame format, it needs certain rules to restrain. The module uses two parameters to specify the conversion rules:

- ✧ Auto framing length: When the data length the module received reach the length of auto framing, the module will trigger the framing operation, and send the data frame to the network.
- ✧ Auto framing period: In certain cases, such as the data sent is little and cause the data in buffer can fill up a data block then the data in buffer is not normally sent. At this time timeout mechanism is needed to ensure the small amount of data can be sent, the timeout is auto framing period.

Two parameters above together form the two trigger terms of auto framing the longer the length of auto framing the higher the transmission performance of the system, the shorter the auto framing period, the higher real-time transmission of the system, so in practice the two parameters can be adjusted according to the needs to obtain the best effect of transmission.

7.1.2.3. Hardware Flow Control Mechanism

Module supports hardware flow control mechanism in transparent transmission mode.

- RTS: it indicates the enable signal of module receiver and it's effective when it's low if the following conditions are met simultaneously .
  - Wireless network is connected
  - The length of data in Uart receiver buffer is not greater than 3/4 of full
- CTS: it indicates the enable signal of host receiver and it's effective when it's low, once the module detects the ineffective CTS signal it will immediately stop sending data to the serial until CTS becomes effective.

7.1.2.4. Exit transparent transmission

In auto-work mode with default configuration, the module's serial is in transparent transmission state At this time, all data through the serial receiving are forwarded to the network, and similarly data received from the network, the module also sent to serial. This is a simple data transfer state at this time, if user wants to do the transmission in command through the serial firstly needs to exit the transparent transmission status. Meanwhile, the module also exit auto-work mode.

The conditions of Module exiting transparent transmission status is shown as following figure.

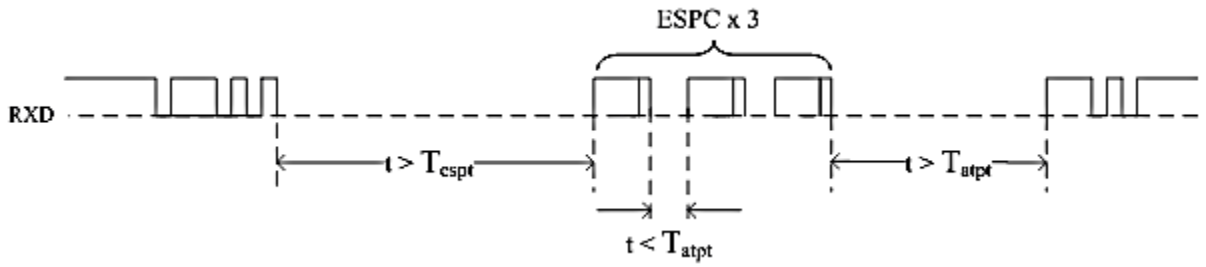

Figure 7-5 Exiting from transparent mode timing diagram

Thereinto,

ESPC: escape character (Default: 0x2B)

T_{espt} : Escape time (Default: 2000mS)

Ready to check escape characters if no data longer than 2 Sec.

T_{atpt} : Auto framing period (Default: 500mS)

t : time between each 3 escape characters (choose 90mS)

must less than Auto framing period (<500 mS.)

After having detected the exiting condition as shown above the module puts out “+OK”,and confirms the serial exiting transparent transmission and switching to the AT+Instruction state

7.1.3. Command work mode

The module also provides a command mode based on serial control to use for different applications of users’ specific requirements.

In this mode, the module works according to user commands issued through the serial, user can completely control the module with command, including parameters configuration, networking control, TCP/IP connection control and data transmission. This is an advanced usage, and also the most flexible for users use Users can discretionarily control the connection and disconnection of the wireless network by order also can create several different types of TCP/IP connection at the same time and keep them transmitting.

To use this mode, please refer to Chapter 9 AT+Instruction control protocol.

7.2. Parameter Details

7.2.1. Wireless parameters

7.2.1.1. SSID

Parameter name	Parameter	Correlative Command
SSID	SSID	AT+SSID
Description		
network identity of Wifi network, the length is 1 to 32 ASCII characters		

7.2.1.2. Encryption mode

Parameter name	Parameter	Correlative Command
Encryption mode	Encryption	AT+ENCRY
Description		
encryption types of Wifi network, options include: ✧OPEN ✧WEP64 ✧WEP128 ✧WPA-PSK(TKIP) ✧WPA-PSK(CCMP) ✧WPA2-PSK(TKIP) ✧WPA2-PSK(TKIP) ✧WAPI （not supported）		

7.2.1.3. Key Format

Parameter name	Parameter	Correlative Command
Key Format	Key Format	AT+KEY
Description		
Key format of WiFi network options include: ✧HEX format ✧ASCII format For WEP encryption the difference between HEX and ASCII formats is the display format of key, such as WEP64 encryption, its key can be 5 ASCII characters (such as 12345) or 10 hexadecimal numbers (such as 3132333435). For WPA/WPA2-PSK encryption HEX and ASCII formats indicate different meanings, HEX format: PMK ASCII format: PSK		

7.2.1.4. Key Index

Parameter name	Parameter	Correlative Command
Key Index		AT+KEY
Description		
key index number of WiFi network, this parameter is only effective in WEP encryption mode, optional range is 1 to 4,it's no sense in other encryption mode		

7.2.1.5. Key

Parameter name	Parameter	Correlative Command
Key	Encryption Key	AT+KEY
Description		
Key string of Wifi network, the keys of different encryption modes and key formats have different length provisions: ✧WEP64 （HEX） ：10 characters ✧WEP64 （ASCII） ：5 characters ✧WEP128 （HEX） ：26 characters ✧WEP128 （ASCII） ：13 characters ✧WPA/WPA2-PSK （HEX） ：64 characters ✧WPA/WPA2-PSK （ASCII） ：8~63 characters		
Tips		
In WPA/WPA2-PSK (TKIP/CCMP) encryption mode as the key format is ASCII, the module must first do the conversion to the key of ASCII format when it's power-on, this process increases about 10 seconds to the starting time And When using WPA/WPA2 encryption, directly using PMK of hexadecimal format can eliminate this delay. However, some APs does not provide PMK (which can be directly input) of hexadecimal format in WPA/WPA2 mode in this case, you can use the WPA key conversion tool (WPA Key Converter.exe) to convert PSK to PMK and set to the module.		

\

7.2.2. Network Parameters

7.2.2.1. DHCP

Parameter name	Parameter	Correlative Command
DHCP	DHCP Enable	AT+NIP
Description		
Used to indicate the network address type of the client if this parameter is enabled, the module will dynamically obtain the network address of the client according to the DHCP protocol.		

7.2.2.2. IP address

Parameter name	Parameter	Correlative Command
IP address	Fixed IP Address	AT+NIP
Description		
Used to specify static IP address of the local network address of the client it's only effective in the case of disable DHCP.		

7.2.2.3. Subnet Mask

Parameter name	Parameter	Correlative Command
Subnet Mask	Subnet Mask	AT+NIP
Description		
Used to specify the subnet mask of the local network address, it's only effective in the case of exiting DHCP.		

7.2.2.4. Gateway address

Parameter name	Parameter	Correlative Command
Gateway address	Gateway Address	AT+NIP
Description		
Used to specify the gateway address of the local network address, it's only effective in the case of exiting DHCP.		

7.2.2.5. DNS Server

Parameter name	Parameter	Correlative Command
DNS Server	DNS Address	AT+NIP
Description		
Used to specify the DNS server address of the local network address, t's only effective in the case of exiting DHCP.		

7.2.3. Parameters of work mode

7.2.3.1. Auto-work mode

Parameter name	Parameter	Correlative Command
Auto-work mode	Auto Mode Enable	AT+ATM
Description		
Used to specify whether auto-work mode of the module is enabled or not.		

7.2.3.2. Protocol Type

Parameter name	Parameter	Correlative Command
Protocol Type	Protocol	AT+ATRM
Description		
Used to specify the protocol type of the default connection module creates in the auto-work mode options include: ✧TCP ✧UDP		

7.2.3.3. CS mode

Parameter name	Parameter	Correlative Command
CS mode	CS Mode	AT+ATRM
Description		
Used to specify the CS mode of the default connection module creates in the auto-work mode options include: ✧Client ✧Server		

7.2.3.4. Server Address

Parameter name	Parameter	Correlative Command
Server Address	Server Address	AT+ATRM
Description		
In the auto-work mode,when CS mode of the default connection module creates is Client, it's used to specify the server module connects to, its input format may be IP address or domain name.		

7.2.3.5. TCP connection timeout

Parameter name	Parameter	Correlative Command
TCP connection timeout	TCP Link TimeOut	AT+ATRM
Description		
In the auto-work mode when C/S mode is set to be TCP server, it's used to specify the maximum connection time of the client which joined the server in case of no data transfer. if there is no data transfer longer than this time the client will be kicked out automatically.		

7.2.3.6. Port number

Parameter name	Parameter	Correlative Command
Port Number	Port Number	AT+ATRM
Description		
Used to specify the port number of the default connection module creates in the auto-work mode.		

7.2.4. Advanced wireless parameters

7.2.4.1. Network mode

Parameter name	Parameter	Correlative Command
Network mode	Network Mode	AT+WPRT
Description		
Used to specify the network mode of the Wifi network, options include: ✧Infrastructure ✧Ad hoc The default setting is Infrastructure. In most cases if what we want to join to is wireless network AP creates using the default setting is just contented. Only when user needs to join Adhoc the parameter may be modified to Adhoc.		

7.2.4.2. Creating adhoc when network does not exist

Parameter name	Parameter	Correlative Command
Create adhoc When network does not exist	Create adhoc When network does not exist	AT+WATC
Description		
Used to specify whether to automatically create network or not if the network does not exist ,When Wifi network type is adhoc. The default setting of system is disabled. This parameter is only effective if the network type is set to Adhoc, if users need to create an Adhoc network, set this parameter to Enable.		

7.2.4.3. BG mode

Parameter name	Parameter	Correlative Command
BG mode	Wireless Standard	AT+WBGR
Description		
Used to specify the BG mode of the Wifi network, options include: ✧B/G fixed mode ✧B mode The default setting of system is B/G fixed mode, ordinarily user doesn't need to modify this parameter.		

7.2.4.4. The maximum rate

Parameter name	Parameter	Correlative Command
The maximum rate	Data Rate	AT+WBGR
Description		
The maximum wireless sending rate, options include: 1M、 2M、 5.5M、 11M、 6M、 9M、 12M、 18M、 24M、 36M、 48M、 54M When BG mode is selected to B mode, options include only the first 4 items. The default setting of system is **36M**, ordinarily user doesn't need to modify this parameter. when the use environment is harsh and wireless signal is worse user can modify this parameter to reduce the sending rate in order to improve the reliability of wireless transmission.		

7.2.4.5. BSSID

Parameter name	Parameter	Correlative Command
BSSID	AP BSSID	AT+BSSID
Description		

Used to specify the BSSID address of WiFi network, options include:

✧Auto

✧Fixed， it needs to input BSSID address

The default setting of system is Auto, ordinarily user doesn't need to modify this parameter When join to WiFi network module can detect BSSID address of the network according with SSID and join in When several networks (APs create) with the same SSID is existed in order to enhance network security user can fix the target AP by modifying this parameter to fix BSSID address. Once the parameter is fixed the module will never connect to the network without suited BSSID.

7.2.4.6. Channel

Parameter name	Parameter	Correlative Command
Channel	Channel Number	AT+CHL
Description		

Used to specify the channel of WiFi network, options include:

✧Auto

✧Channel 1~14

The default setting of system is Auto, ordinarily user doesn't need to modify this parameter. When join to WiFi network, the module will automatically scan all channels to detect the target network The time module needs to scan each channel is 150ms,and the completion of all channel scan takes about 2s.In order to reduce the scanning time and improve networking speed, user can specify channel number through modifying this parameter What should be noted Once user set it to fixed channels the module scans only the specified channels if the target AP has changed the channel number module will never connect to the network successfully.

7.2.4.7. Auto Retry

Parameter name	Parameter	Correlative Command
Auto Retry	Auto Retry Count	AT+CHL
Description		
This parameter is only effective in auto-work mode it‘s used to specify the auto retry number when networking is failed or network disconnects unnaturally options include: ✧Never ✧Ever ✧1~254 The default setting of system is Ever		

7.2.4.8. Wireless roam

Parameter name	Parameter	Correlative Command
Wireless roam	Wireless Roam	AT+WARM
Description		
Used to specify whether to enable the function of wireless roam or not. The default setting of system is disabled What should be noted when the parameter of BSSID is set to fixed wireless roam will become no effect.		

7.2.4.9. Channel List

Parameter name	Parameter	Correlative Command
Channel List	Channel List	AT+CHLL
Description		
Used to specify the wireless region settings, the ranges of the 2.4G frequency bands different countries and regions open is different, such as the United States is 1 ~ 11 channels, Europe is 1 to 13 channels ,and Japan is 1 to 14 channels. The system default setting is 1~14 channels ordinarily user doesn't need to modify this parameter. Another use of this parameter is reducing the time of scanning and networking by modifying the channel range. For example, we have known the AP may be connected to is in 1,6,11 channels, the channel list can be set only 1,6,11, so that the module will only scan these three channels in the process of networking, thus the purpose of shortening the networking time is reached. Another should be noted is that parameter of channel has higher priority than the parameter of channel list, that is, when the parameter of channel is set to the specified channel, even if this channel is not included by the channel list, networking will still succeed .		

7.2.5. Port parameters

7.2.5.1. Baud Rate

Parameter name	Parameter	Correlative Command
Baud Rate	Baud Rate	AT+UART
Description		
Baud rate setting of serial options include ： ✧1200~115200bps The default setting of system is 115200bps。		

7.2.5.2. Data Bits

Parameter name	Parameter	Correlative Command
Data Bits	Data Bits	AT+UART
Description		
Length setting of serial data bits options include: ✧8 bits ✧7 bits The default setting of system is 8 bits		

7.2.5.3. Stop Bits

Parameter name	Parameter	Correlative Command
Stop Bits	Stop Bits	AT+UART
Description		
Length setting of serial stop bits options include: ✧1 bit ✧2 bits The default setting of system is 1 bit.		

7.2.5.4. Parity Bit

Parameter name	Parameter	Correlative Command
Parity Bit	Parity	AT+UART
Description		
Parity Bit setting of serial options include: ✧no parity ✧odd parity ✧even parity The default setting of system is no parity.		

7.2.6. Parameters of transparent mode

7.2.6.1. Auto framing length

Parameter name	Parameter	Correlative Command
Auto framing length	Data Trigger Length	AT+ATLT
Description		
When serial is in transparent transmission mode and received data reaches the length specified. then module will force to frame data to network by trigger the sending process, the optional range is 64 ~ 1024 bytes. The default setting of system is 512 bytes.		

7.2.6.2. Auto framing period

Parameter name	Parameter	Correlative Command
Auto framing period	Data Trigger Timeout	AT+ATPT
Description		
When serial is in transparent transmission mode adnd the data received is less than the length of framing, if the waiting time is greater than this parameter specified , module will force to frame a network frame by trigger the sending process. The timeout period of auto framing has an optional range of 100 ~ 10000ms, the minimum accuracy is 100ms. Note: this setting must be less than the escape time. The default setting of system is 500mS.(0.5 Sec.)		

7.2.6.3. Escape Character

Parameter name	Parameter	Correlative Command
Escape Character	Escape Character	AT+ESPC
Description		
This parameter is specified the escape character used to exit the transparent transmission mode for serial such as "+" , when system is in the state of detecting escape character and the data receives is three and only three consecutive escape characters, it will exit the transparent transmission mode. The default setting of system is 0x2B, that is characters "+" in ASCII.		

7.2.6.4. Escape time

Parameter name	Parameter	Correlative Command
Escape time	Escape Trigger Period	AT+ESPT
Description		
When in transparent transmission mode if no data received time is greater than this parameter specifies, it will automatically detect the escape characters. Optional range is 100 ~ 10000ms, the minimum accuracy is 100ms. Note : the setting must be greater than auto framing period. The default setting of system is 2,000mS.(2 Sec.)		

7.2.7. System parameters

7.2.7.1. System password

Parameter name	Parameter	Correlative Command
System password	Login Password	AT+PASS
Description		
The login password for accessing the module through WEB server or wireless configuration. The default setting of system is “000000” .		

7.2.7.2. WEB server

Parameter name	Parameter	Correlative Command
WEB Server	Web Server	AT+WEBS
Description		
Used to specify whether to enable the WEB server or not and the server port. The default setting of system is enabled the default port is 80.		

7.2.7.3. Command Mode

Parameter name	Parameter	Correlative Command
Command Mode	Command Mode	AT+CMDM
Description		
Used to specify the control protocol of the module in command mode options include: ✧AT+Instruction ✧Compatible Protocol The default setting of system is AT+Instruction mode, ordinarily user doesn't need to modify this parameter The command mode of compatible protocol is used to be compatible with the control protocol of TLG09UA01/02 products. If user wants to use this mode, please call for the Technical Support for more help.		

7.2.7.4. GPIO1 mode

Parameter name	Parameter	Correlative Command
GPIO1 mode	GPIO Mode	AT+IOM
Description		
Used to specify the work mode of GPIO1,options include: ✧System function ✧Input ✧Output The default setting of system is system function.		

7.3.Default setting

parameter	value	description
Wireless setting		
SSID	"default"	The ssid of wireless network is “default”
Encryption mode	OPEN	The encryption mode of wireless network is open
Key format	-	
Key Index	-	
Key	-	

Network setting		
DHCP	Enable	Enable DHCP protocol to dynamically obtain IP address
IP address	-	
Subnet Mask	-	
Gateway address	-	
DNS server	-	
Work mode setting		
Auto-work mode	Enable	Enable the auto-work mode
Protocol type	TCP	Default connection: When it's set to TCP server the default timeout is 120second
CS mode	Server	
Server address	-	
TCP connection timeout	120	
Advanced wireless setting		
Network mode	Infra	Network mode is Infrastructure
Create adhoc when network does not exist	-	-
BG mode	B/G	Wireless mode is BG fixed
Maximum rate	36M	The Maximum sending rate is 36M
BSSID	Auto	Forbid to fix the BSSID address of wireless network
Channel	Auto	Detect the operating channel of wireless network automatically

Auto retry	255	Retry forever automatically
Wireless roam	Disable	Forbid to do the wireless roam
Channel list	0x3fff	1~14 channels
Serial setting		
Baud rate	115200	The data format of serial is set to: Baud rate is 115200bps; 8 bits of data bits 1 bit of stop bits No parity of parity bit
Data bits	8 bits	
Stop bits	1 bit	
Parity bit	None	
The setting of transparent mode		
Auto framing length	512	The length is 512 bytes
Auto framing period	500ms	The period is 500ms
Escape character	0x2B	The character is 0x2B,that is “+” in ASCII
Escape time	2000ms	The period is 2000ms
System setting		
System password	"000000"	Login password of system is "000000"
WEB server	Enable	Enable WEB server port is 80
Command mode	AT+	The system command is AT+Instruction set
GPIO1 mode	System	The setting of GPIO1is system function

8. CONFIGULATION MANAGEMENT MANUAL

8.1.Configuration through configuration management software

8.1.1. Introduction

We offer a configuration hypervisor that can manage TNS-Wii3 module easily for configuration query , config , function test etc

it's main function includes,

- ✧ module management
  - ■ management through serial
  - ■ management through wireless connection
- ✧ parameter configuration
  - ■ modify/query module parameters
  - ■ import/export parameters
  - ■ modify parameters for a group of modules
  - ■ resume to default setting
- ✧ function test
  - ■ wireless network command test
  - ■ socket command test
  - ■ AT+ instruction test
- ✧ firmware upgrade
- ✧ system information query

8.1.2. Module management

8.1.2.1. Management through serial connection

1) Connect the TNS-Wii3 module to the serial adapter then turn it power-on ；

2) Open the UART-WIFI configuration hypervisor select the port number of connection from port list you can select ‘auto’ unless you make sure ；

3) Click ‘search module’ if the connection port is selected to ‘auto’ and the computer has more than one serial it maybe expend a long time for searching, The following sketch map will show after search completed ：

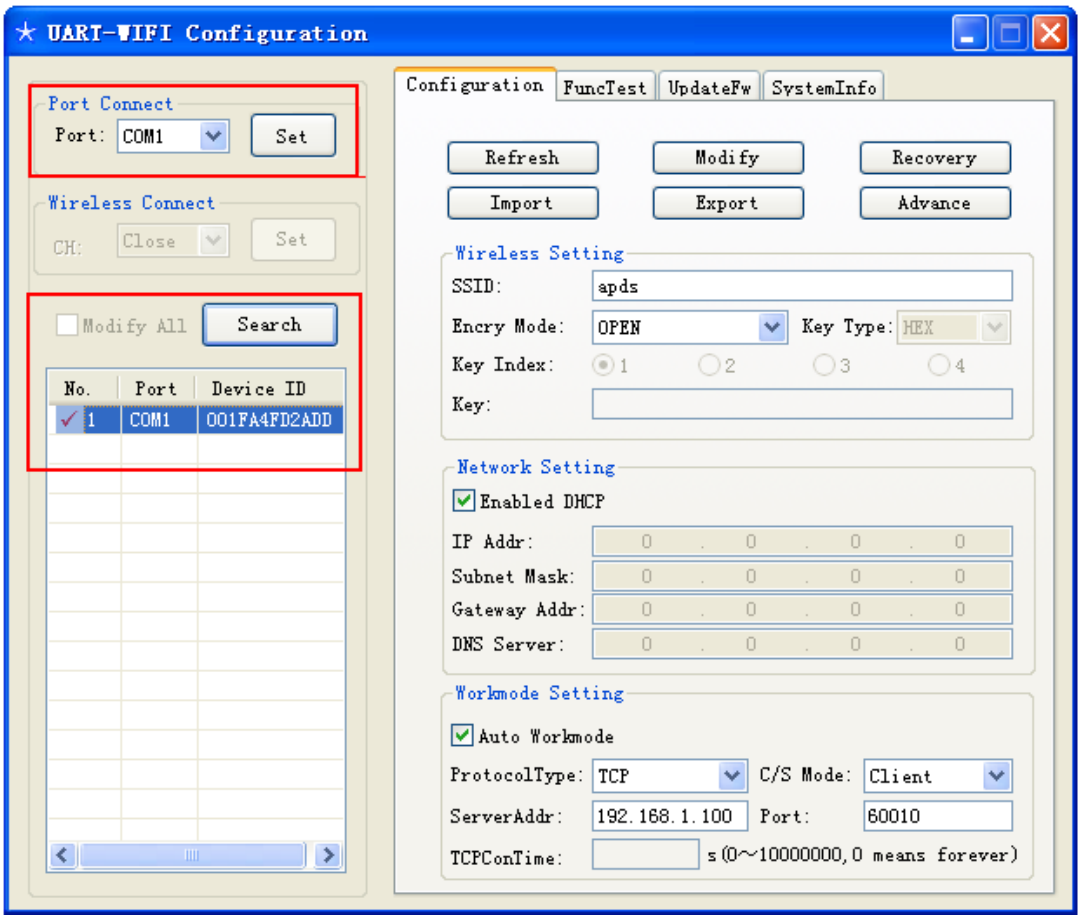

Figure 8-1 serial connection sketch map

8.1.2.2. Management through wireless connection

Note ：Using this function needs to choose correct wireless adapter and install wireless driver correctly.

1) Plug the wireless adapter in computer ；

2) Install wireless driver the successful result is shown as the following sketch map ；

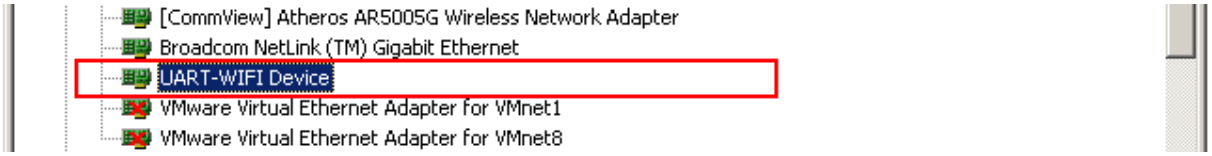
[CommView] Atheros AR5005G Wireless Network Adapter
Broadcom NetLink (TM) Gigabit Ethernet
UART-WIFI Device
VMware Virtual Ethernet Adapter for VMnet1
VMware Virtual Ethernet Adapter for VMnet8

Figure 8-2 Install wireless driver

3) Open the UART-WIFI configuration hypervisor if the driver is installed successfully setting frame of wireless connection will be in activation status ；

4) Click ‘setting’ button input system password （only the module of which the system password matches with the setting can be scanned） ；

5) Select scan channel from channel list. It will scan all channels from 1 to 14 ,if ‘auto’ is selected ；

6) Click ‘search module’ if channel is selected to ‘auto’ it will expend a long time to search the completed result is shown as the following sketch map ：

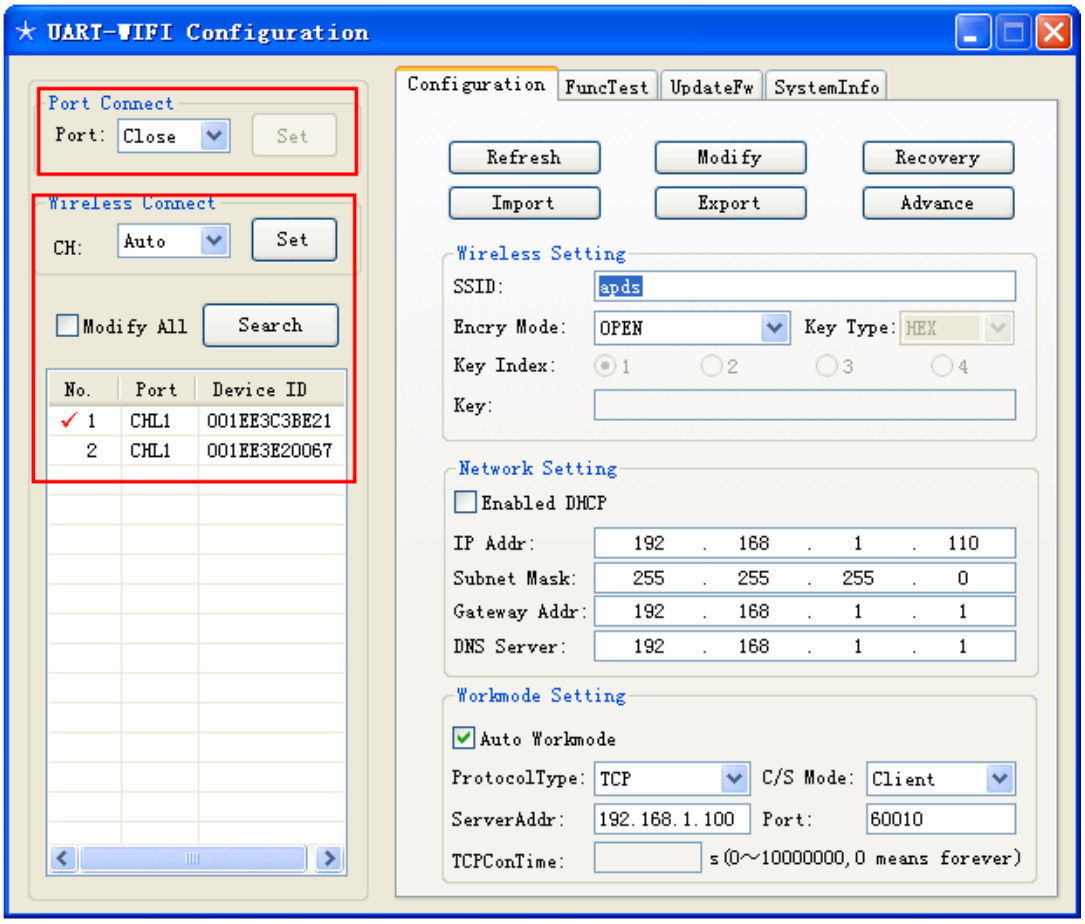

Figure 8-3 sketch map of wireless connection

8.1.3. Configuring parameter

This section offers the function of fast query/modify configuration parameter of module for user.

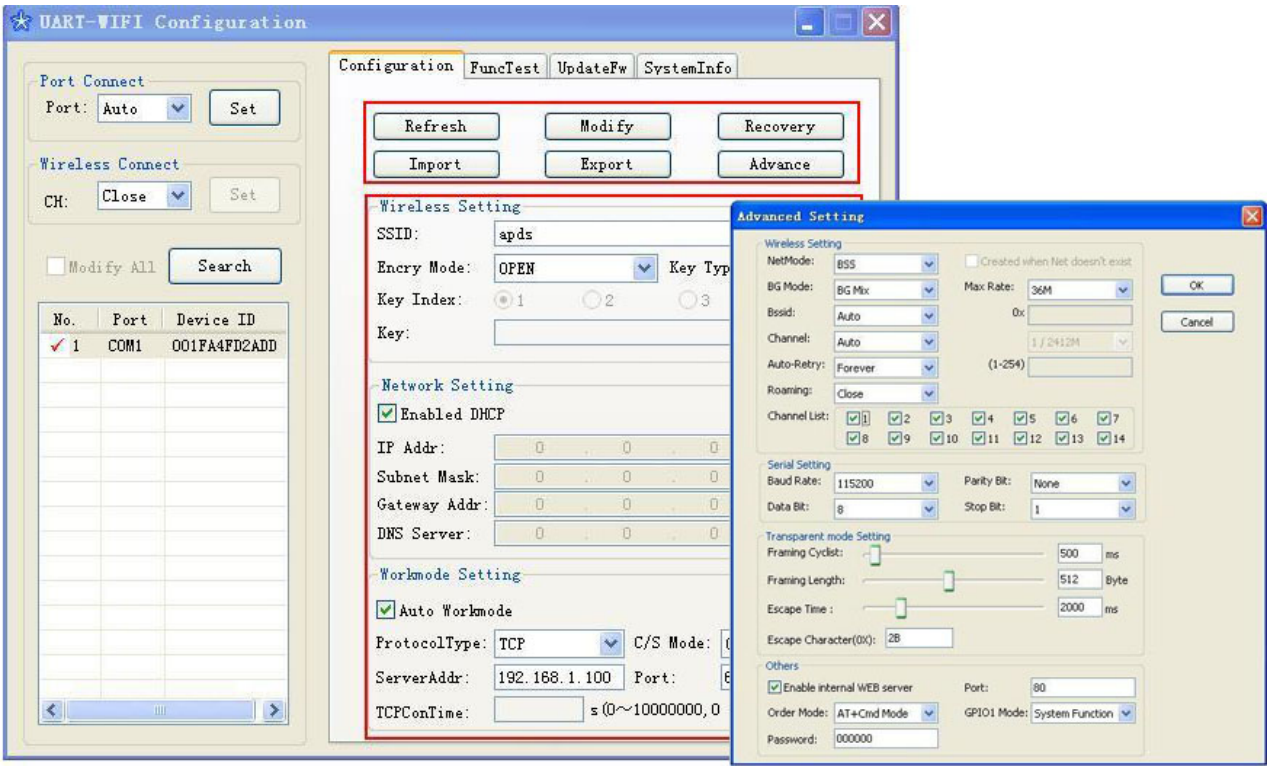

Figure 8-4 configure parameters

8.1.3.1. Refresh parameter

User can refresh the configuration parameter from wireless module and show in the display interface through clicking the 'refresh parameter's button.

8.1.3.2. Submit modification

User can click 'submit modification' button after modifying configuration parameter (including parameter in advanced setting) in the display interface to save the parameters into wireless module. New parameters will become effective until wireless module has been reset user can select to reset at once or manually reset later in pop-up dialog box after modified it's shown as the following sketch map,

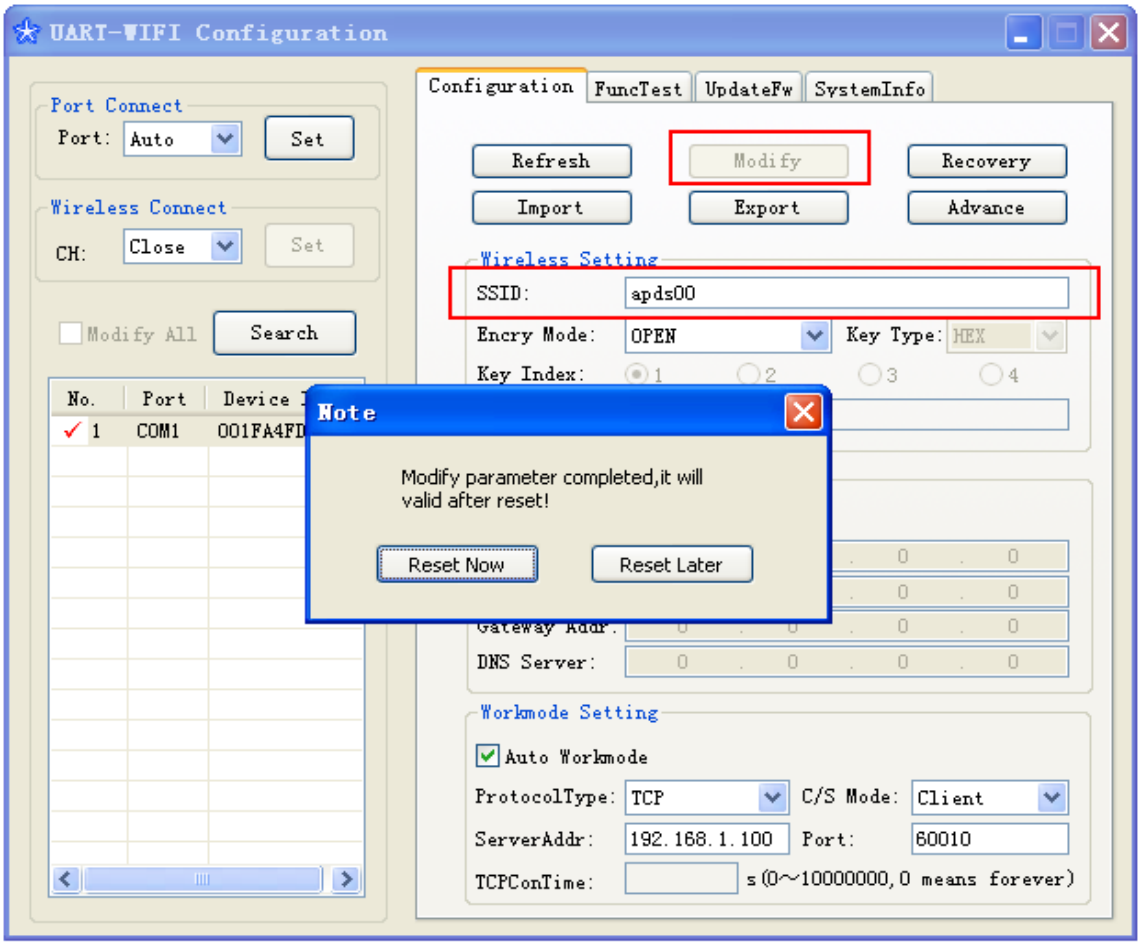

Figure 8-5 sketch map of submitting modification

8.1.3.3. Restore to factory setting

User clicks ‘’ button to restore the configuration parameters of the wireless module into factory status. After restoring the factory setting becomes effect until the module has been reset.

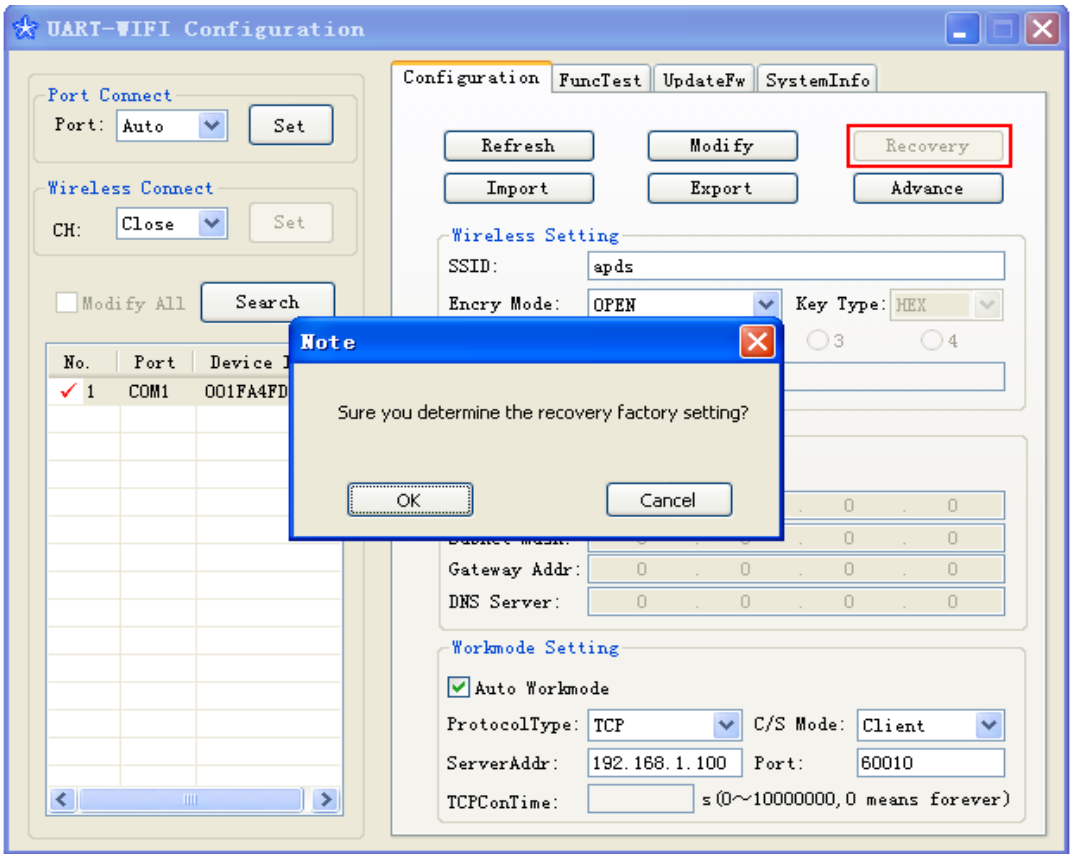

Figure 8-6 sketch map of restoring to factory setting

8.1.3.4. Import/export parameters

User can save all configuration parameters in display interface to the specified configuration file through clicking the ‘export parameters’ button, and apply all parameter which are saved in configuration file through clicking ‘import parameter’ button. What should be noted is that, using import parameter function only imports parameters to the display interface the imported parameters can be wrote in wireless module actually until clicking the ‘submit modification’.

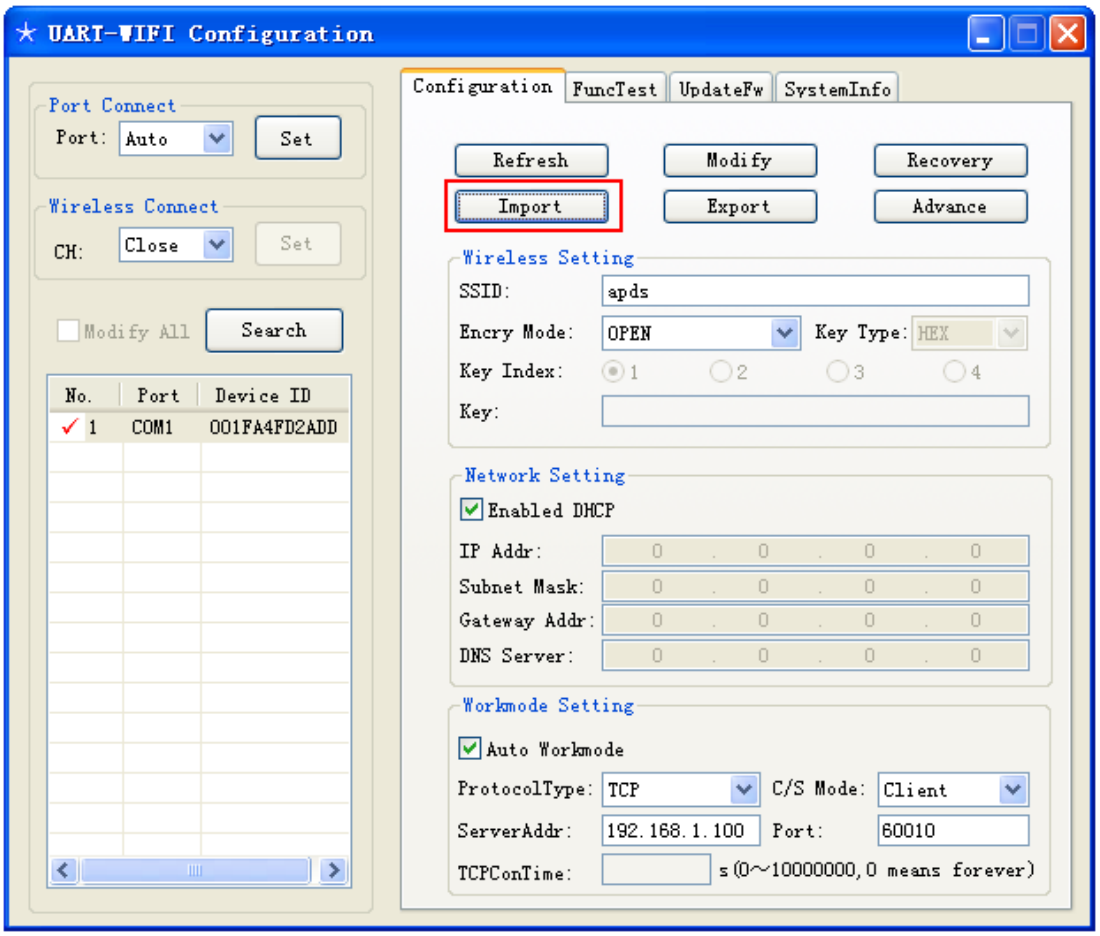

Figure 8-7 sketch map of Importing parameters

8.1.3.5. Group modification

Group modification will be activated when configuration hypervisor has searched for more than one wireless module. If user selects the function the modified parameters will be applied to all of the wireless modules automatically through clicking ‘modify all’. This function can predigest operation steps and enhance work efficiency when a lot of modules need to be restored to the default configuration.

8.1.4. Function test

This section offers the function of fast testing AT+ instruction for user the user can jump over this section when using auto-work mode. Additionally this function cannot work while the module is configured through wireless connection.

User can send command through shortcut button of usual instruction or inputting AT+ instruction directly it is shown as the following sketch map,

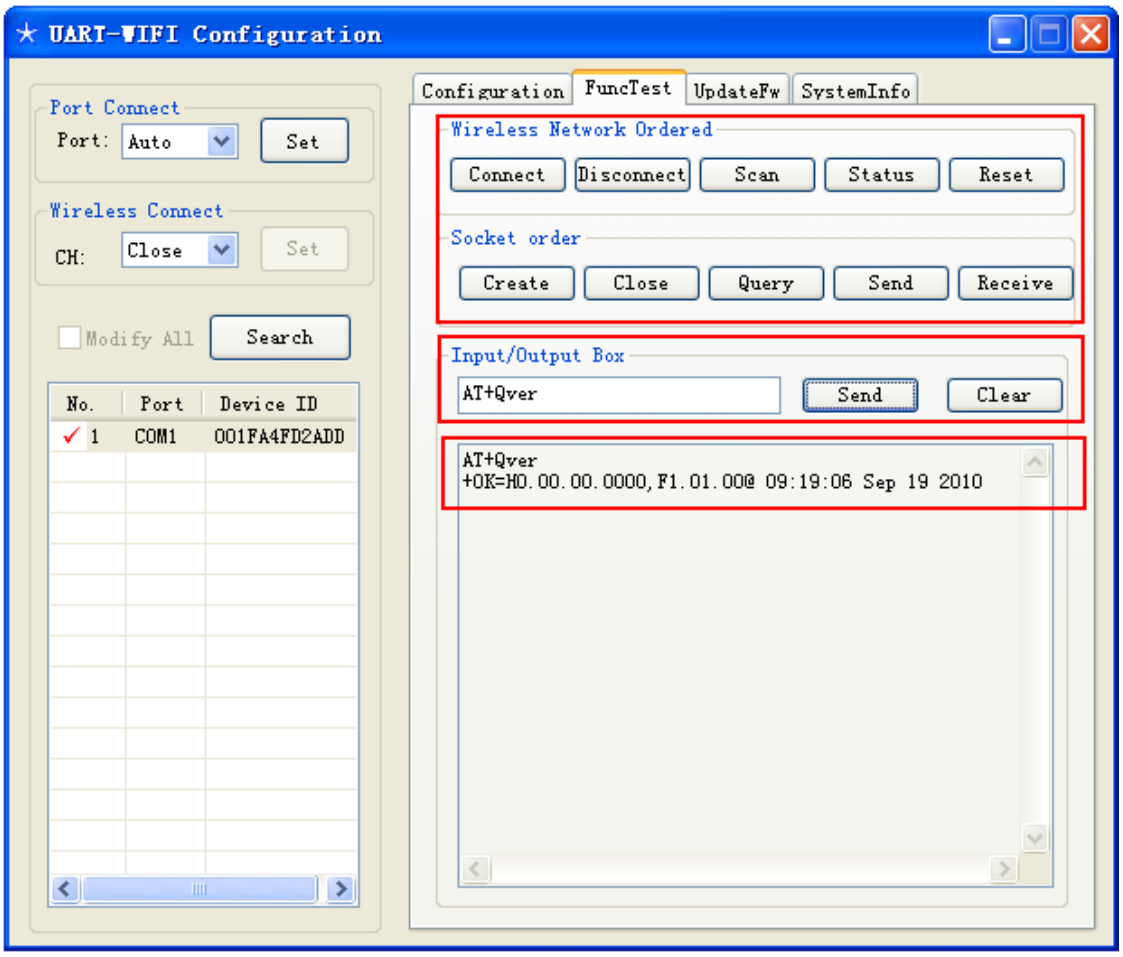

Figure 8-8 function test page

8.1.4.1. Network scanning

User can click ‘scan’ button to scan network as the following sketch map. Scan result will show in the following display frame such as network type encryption network MAC channel signal strength etc.

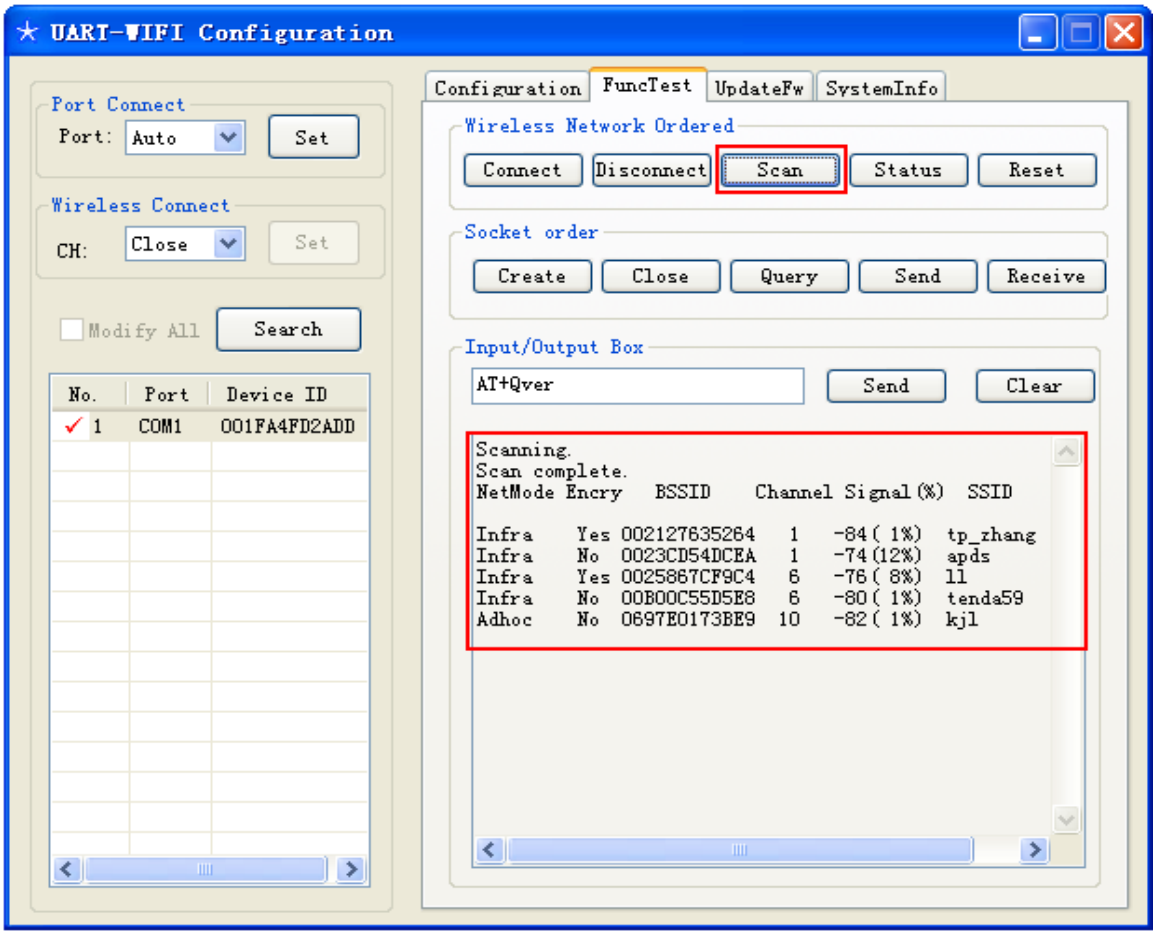

Figure 8-9 network scanning

8.1.4.2. Join/Disconnect network

User can click the ‘’ button to join or disconnect the wireless network as the following sketch map, the result will show in the following display frame.

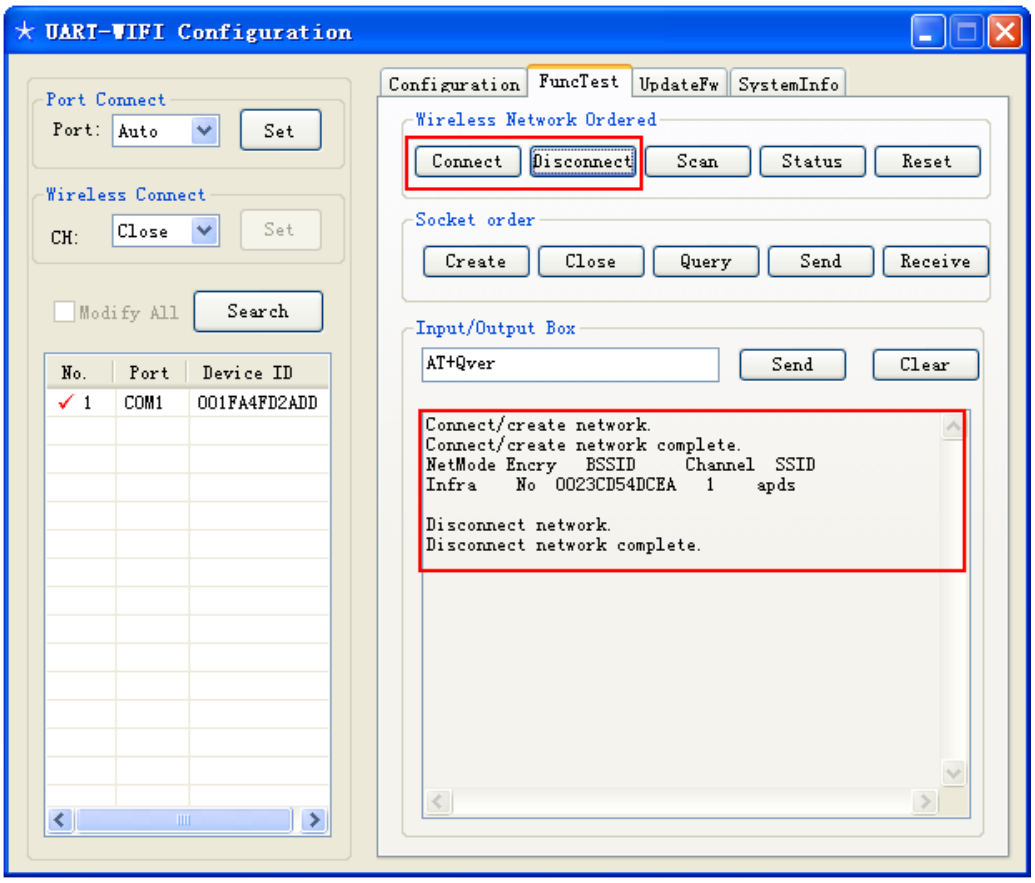

Figure 8-10 join/disconnect network

8.1.4.3. Query network status

User can click the ‘state’ button to query network connection status as following sketch map, the result will show in the following display frame.

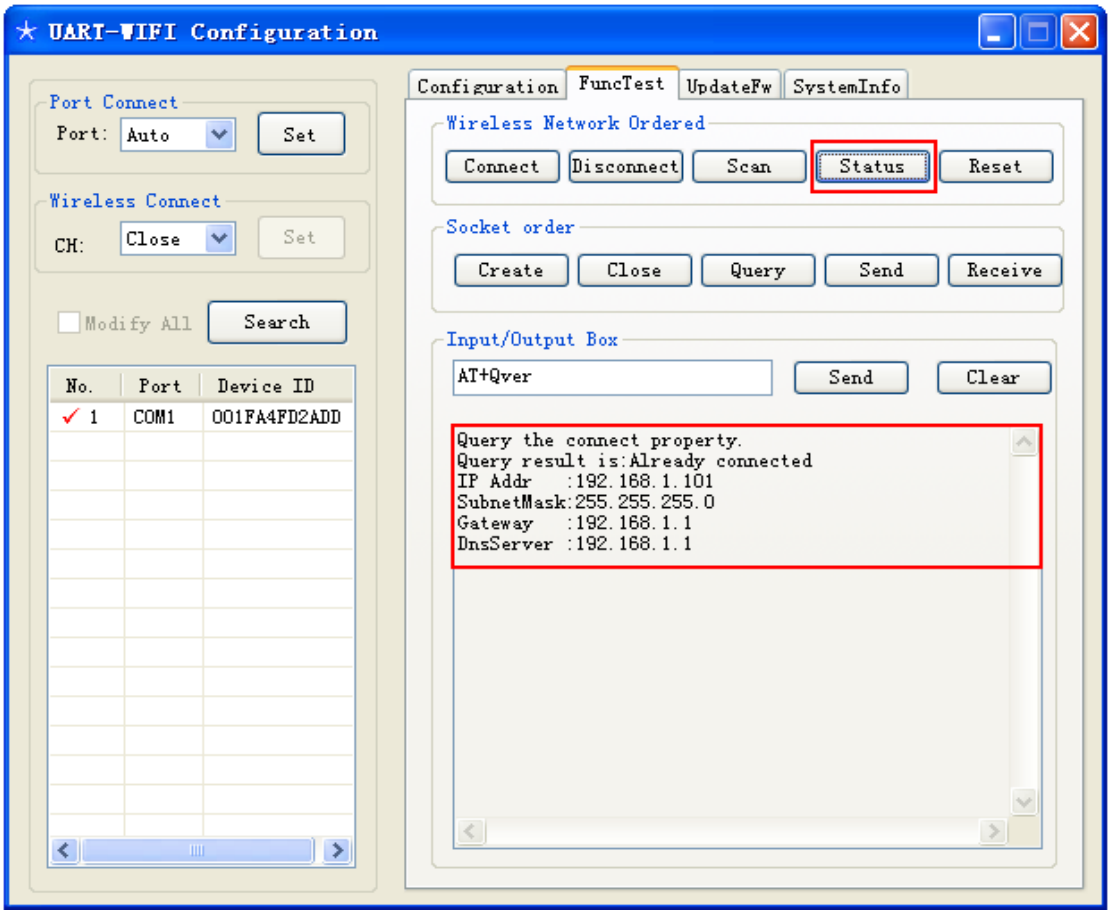

Figure 8-11 query network status

8.1.4.4. Create socket

User can click ‘create’ button to create socket as the following sketch map. Click the ‘Yes’ button after configured each parameter It will return a socket number after creating successfully.

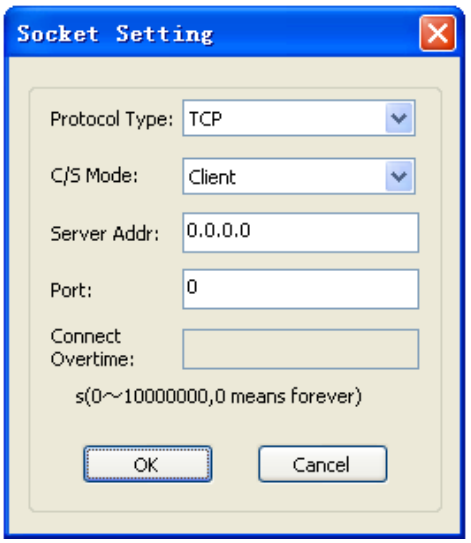

Figure 8-12 interface of creating socket

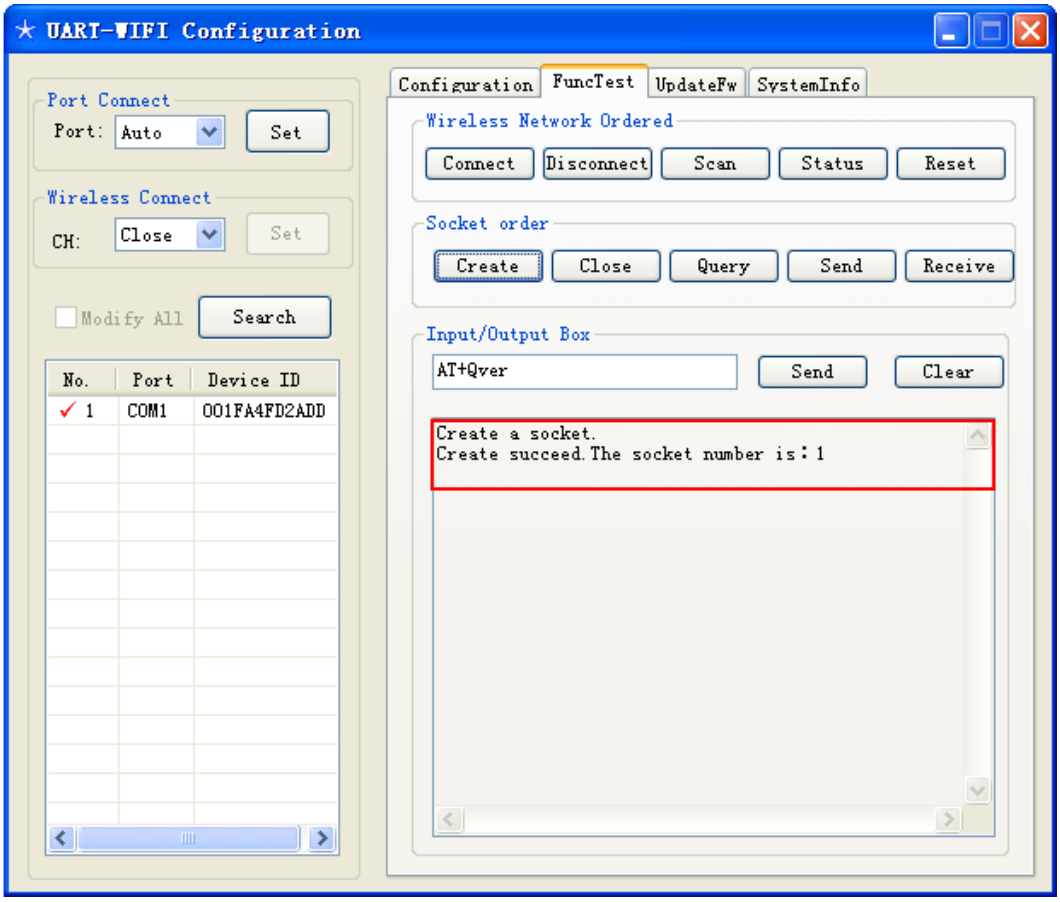

Figure 8-13 interface of the result of creating socket

8.1.4.5. close socket

User can delete the socket connection through clicking ‘close’ button and inputing the socket number which is expected to close.

8.1.4.6. query socket status

User can query socket status through clicking ‘query’ button and inputing the socket number which is wanted, the state of socket will return in the display frame after clicking ‘yes’ button.

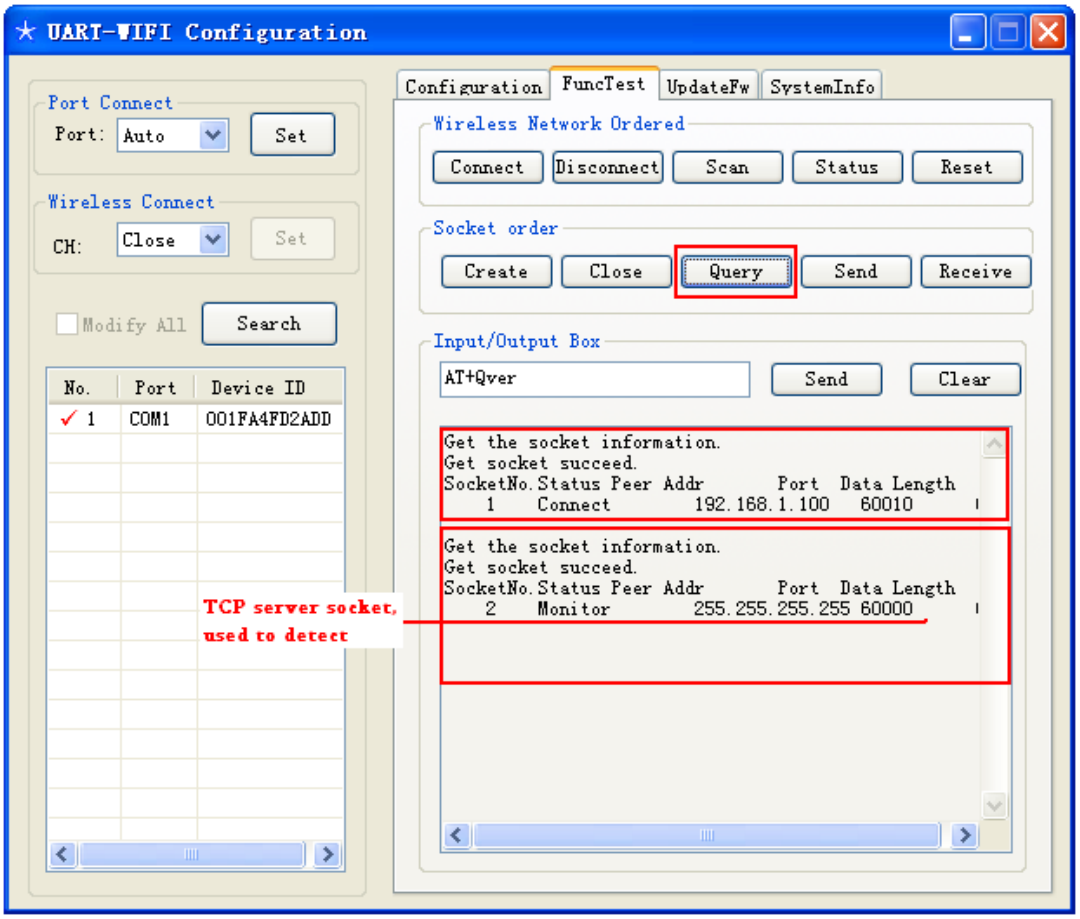

Figure 8-14 socket status querying

Description,

1) As shown above, the querying results return from two sockets are different. Because the second socket type is TCP server, which is in monitor state after creating successfully, its result does not only contain itself state but also includes the connection information of Clients which are connecting to the server(these sockets are created by system automatically)， as socket3 and socket4 shown in sketch map.

8.1.4.7. Socket sending

User can send data through socket by clicking ‘send’ button and inputing socket number (the socket of TCP server can’t be used to send or receive data directly what is input should be the socket number of the connection between clients and the server) and data that need to send the sending accomplishment information will return in the display frame after clicking ‘yes’ button.

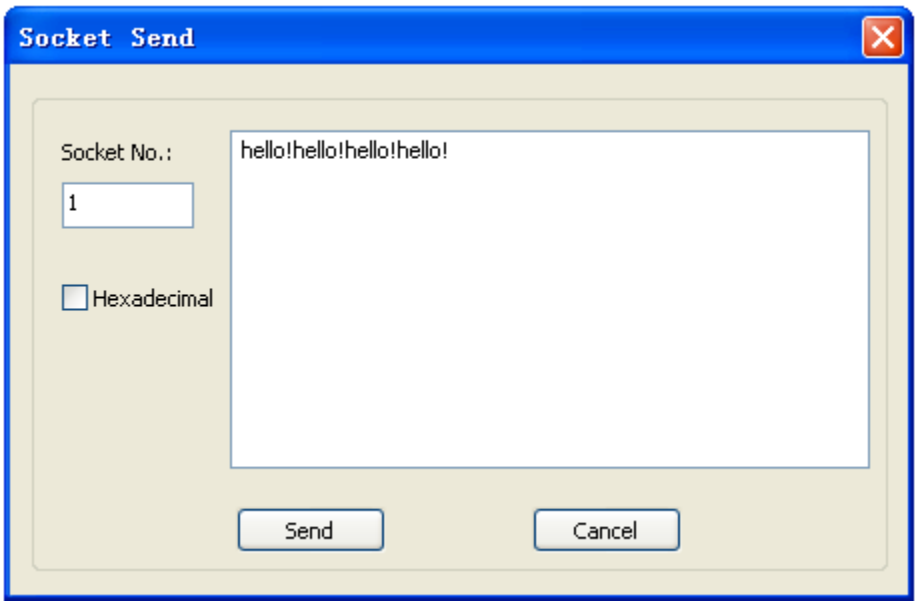

Figure 8-15 send data through socket

8.1.4.8. Socket receiving

User can receive data through socket by clicking ‘receive’ button and inputing socket number (the socket of TCP server can’t be used to send or receive data directly what is input should be the socket number of the connection between clients and the server and data size that expected to receive in pop-up dialog box the data will show in the receive frame after clicking ‘receive’ button shown as figure8-18.

Before receiving data please use ‘query’ command to confirm whether the socket receiver buffer has saved data in it at first.

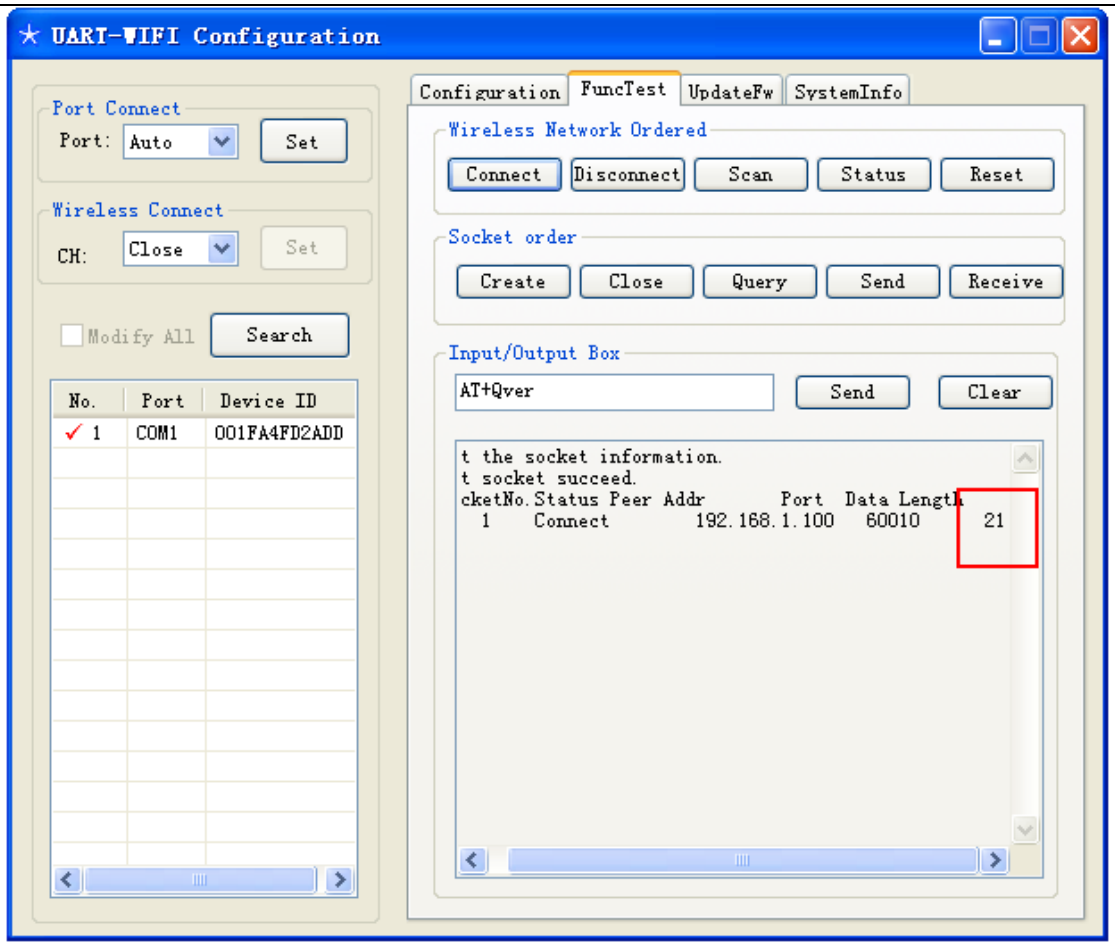

Figure 8-16 query the receiver buffer

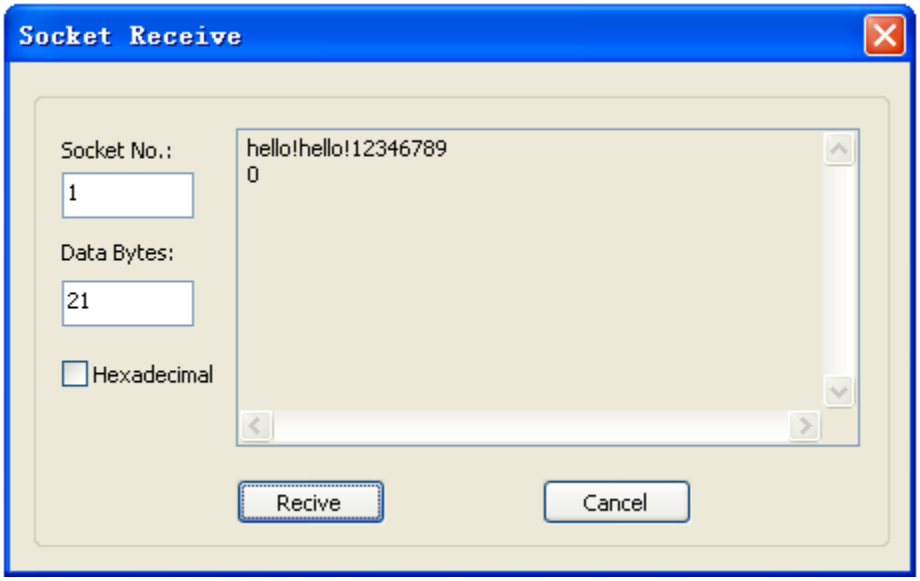

Figure 8-17 socket receiving

8.1.5. System information

User can query MAC address hardware version information and firmware version information of the module in this section, the following sketch map is the show.

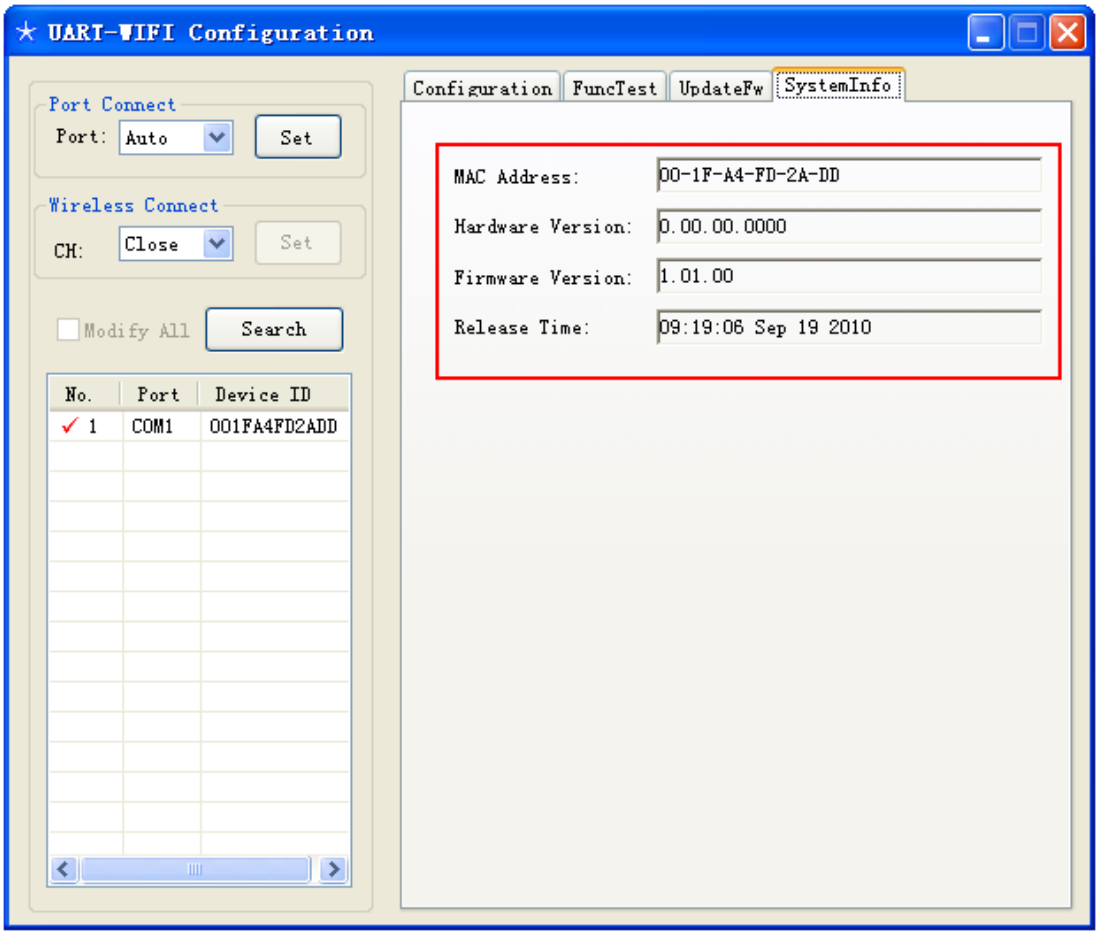

Figure 8-18 system information

8.1.6. Firmware upgrade

This function will be activated when the module has connected to the wireless network.

User can acquire the function of module firmware upgrade in this section, as the following sketch map shows （what should be noted is that, please read the notice carefully before upgrading, otherwise, failure will make the module destroyed） .

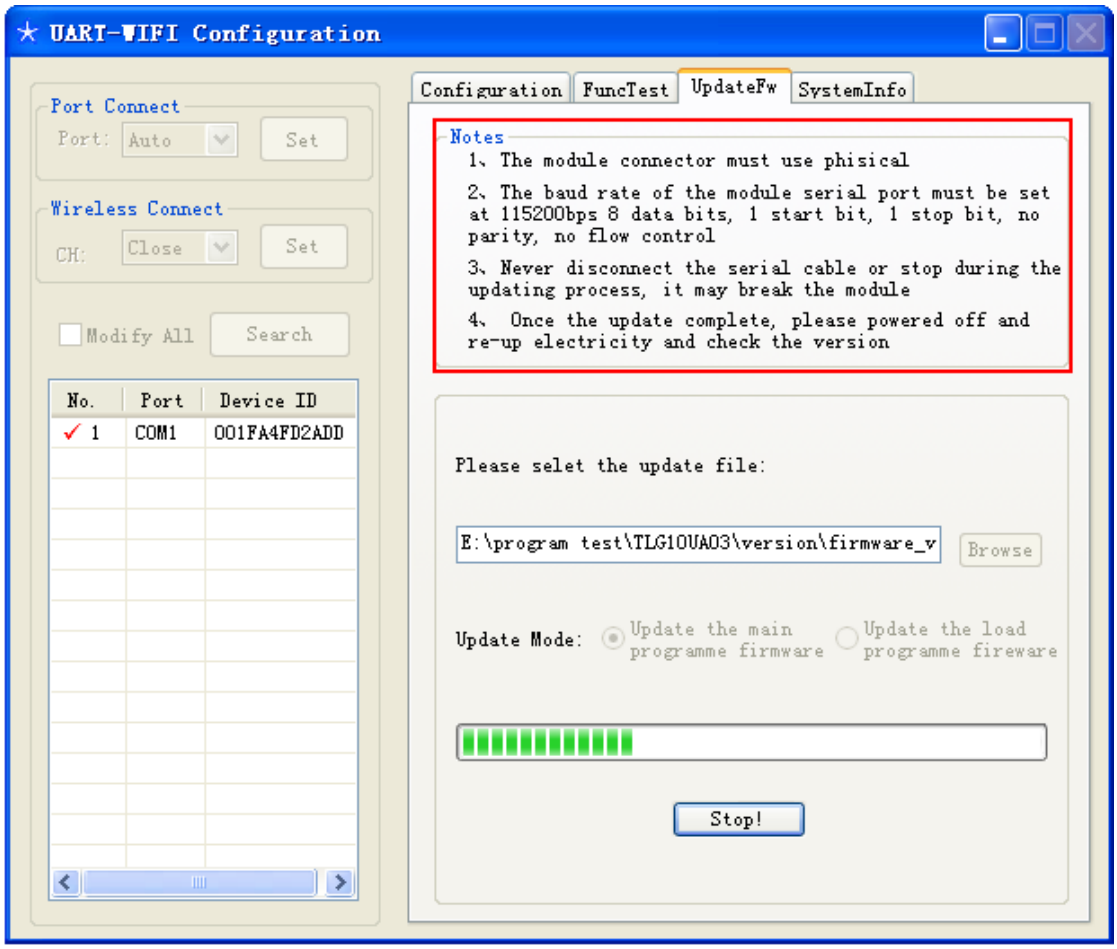

Figure 8-19 firmware upgrade

8.2.Configuration through WEB server

WEB server has been embedded in this product, it can support the function of parameters configuration with IE browser, the method is as follow,

Notices,

1) Make sure the module has connected to the network successfully before using web page configuration;
2) The default port number of the WEB server is 80， so it only needs to input address in address column of browser if user has modified the web server port user must input port number otherwise the net cannot be opened, for example when the port number is set to 8080， the access address of the web server is http://192.168.1.20:8080 ；
3) Please use Windows IE browser to access the server as well as you can ；

8.2.1. Query/set configuration parameter

1) Open IE browser connect after inputting IP address(and the port number sometimes) of wireless module in address column the login interface will appear, input user name ‘admin’ and login password of module （default password is 000000） ；
2) The configuration web page is shown as the following sketch map if user want to modify configuration parameters of wireless module you need to click ‘save‘ button to submit the modification ；

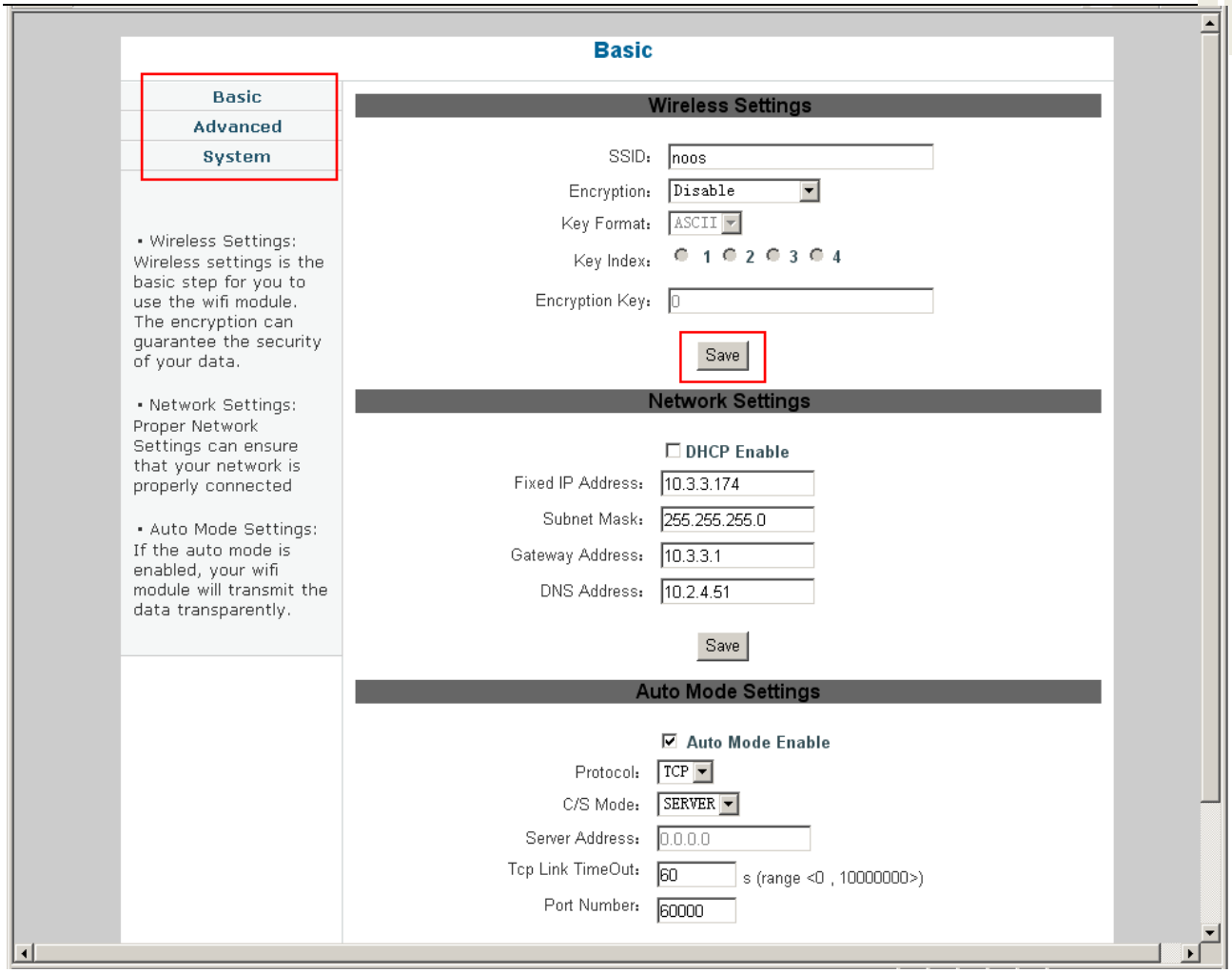
Basic
Basic
Advanced
System
• Wireless Settings: Wireless settings is the basic step for you to use the wifi module. The encryption can guarantee the security of your data.
• Network Settings: Proper Network Settings can ensure that your network is properly connected
• Auto Mode Settings: If the auto mode is enabled, your wifi module will transmit the data transparently.
Wireless Settings
SSID: noos
Encryption: Disable
Key Format: ASCII
Key Index: 1 2 3 4
Encryption Key: 0
Save
Network Settings
DHCP Enable
Fixed IP Address: 10.3.3.174
Subnet Mask: 255.255.255.0
Gateway Address: 10.3.3.1
DNS Address: 10.2.4.51
Save
Auto Mode Settings
Auto Mode Enable
Protocol: TCP
C/S Mode: SERVER
Server Address: 0.0.0.0
Tcp Link TimeOut: 60 s (range <0 , 10000000>)
Port Number: 60000

Figure 8-20 web page of parameter modification

After completing the submission, the wireless module will restart automatically the web page will be also refreshed in ten seconds.

8.2.2. Firmware upgrade on line

The product supports firmware upgrade online through web page, it's shown as following sketch map,

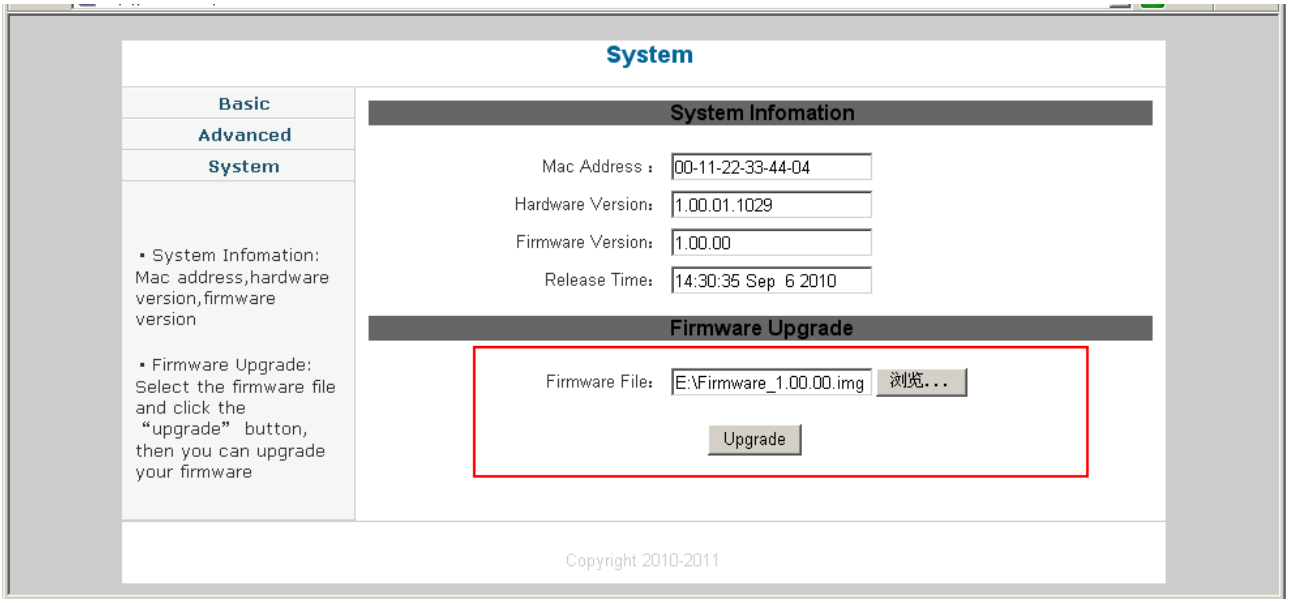

Figure 8-21 online upgrade of firmware

8.3.Configuration through hyper terminal program

User can ignore the section if only using the wireless module in auto-work mode.

For the user who hopes to test the function of AT+instruction, Windows Hyper Terminal which is embedded in Windows operation system can be used to input AT+ instruction directly for parameter configuration of wireless module and function test. What should be descripted is that the serial debugging softwares (serial genius, serial master, etc) that referred in preamble all can be used for AT+instruction test this section just takes hyper terminal program as an example.

1) Open hyper terminal program (Windowsstart—program—accessories—communication—super terminal program), input connection name and icon, select serial number and parameters (the same as the wireless module), what should be descripted is that the option of flow control must be set to none in command mode the setting is shown as following sketch map,

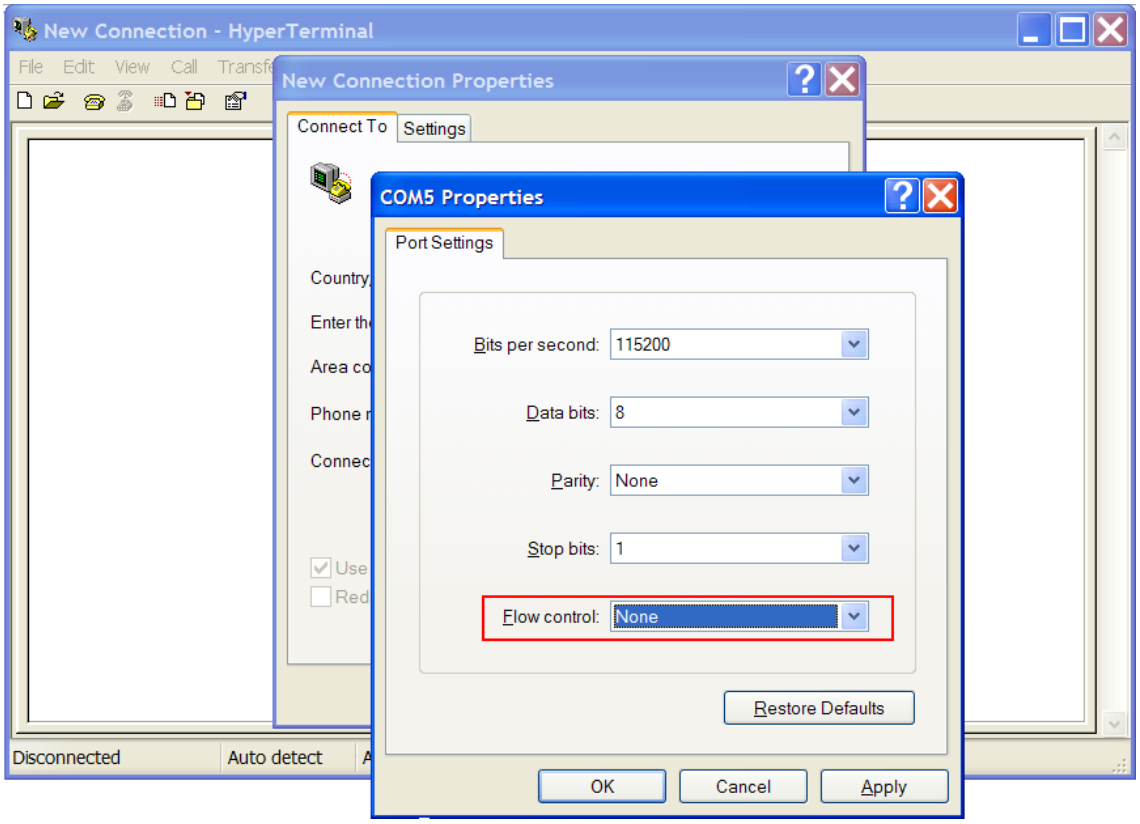

Figure 8-22 the configuration of super terminal

2) If the wireless module has started configuration mode （see the 7.1.1 section） or the work mode is set to command mode please jump to step 5 directly otherwise it needs to make the module exiting the transparent transmission mode according to following approach at first （refer to section 7.1.2.4 ） ；

3) Open a notepad to edit escape character string （the default escape character is‘+’ ） and save.

4) Wait for the time specified by the parameter of escape time （its default setting is 2 second） ， select ‘send text file’ in the ‘transmit’ menu send escape character string file， the module return ‘+OK’ information if success ；

5) Input ‘AT+E’ instruction to open input return display （before it, the character that user input cannot

be display in the super terminal interface)　;

6) Thus user can use super terminal program to test the most of AT+ instruction set，for example, the command of network scan can be insteaded of inputtig 'AT+WSCAN', it's shown as the following sketch map.

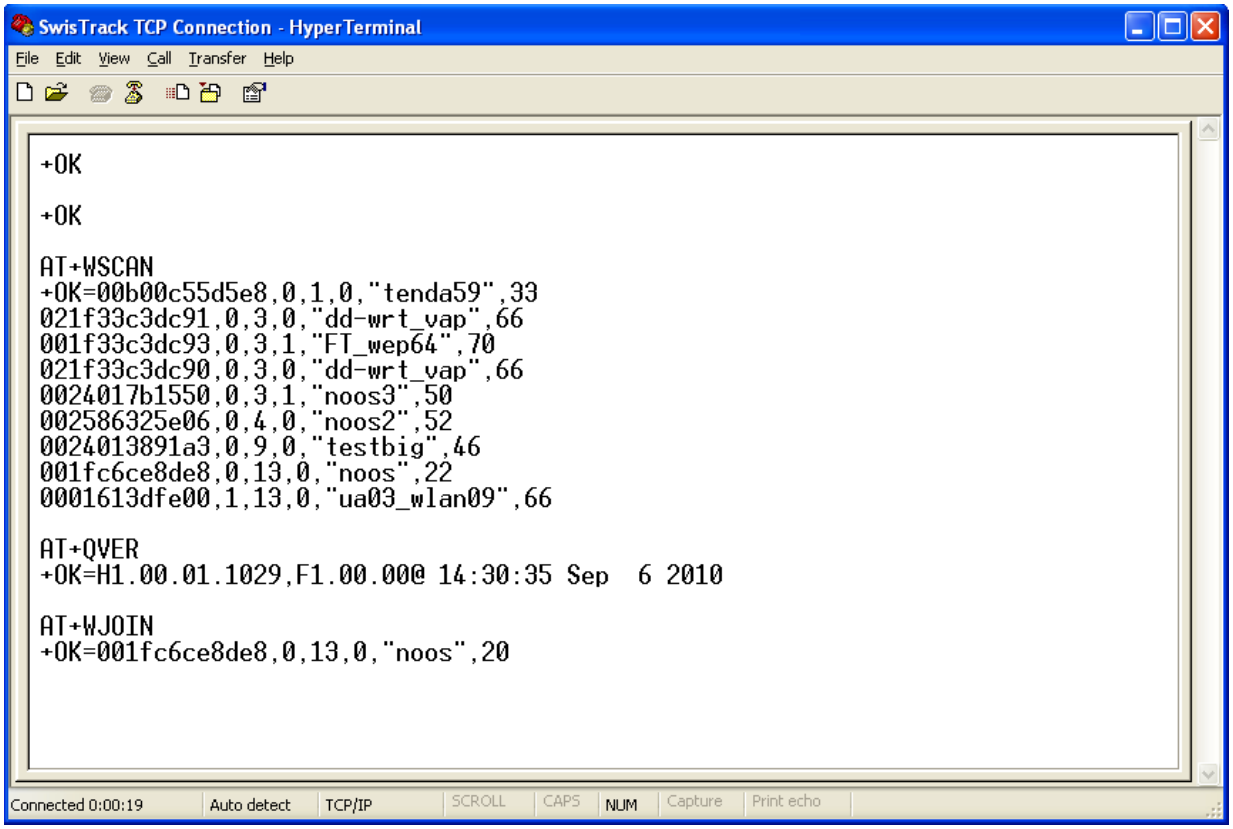

Figure 8-23 instruction test

9. AT+INSTRUCTION CONTROL PROTOCAL

User can ignore this chapter if only using auto-work mode.

9.1.Syntax Introduction

This module uses AT+Instruction protocol as user control protocol.AT+Instruction protocol is based on the instruction of ascii command style, The description of syntax format and management process is as follow.

9.1.1. Syntax Format

■ Format Description

< > means the parts must be included

[ ] means the optional part

■ Command Message

AT+<CMD>[op][para1],[para2], [para3] ,[para4]…<CR>

'AT+' means the leader of Command message

'CMD' means command string

'[op]' means the symbol of Command operator, when the command requires parameters, it can specify the operation type of parameters it includes,

'=' means the leader symbol of parameters or returns

'=!' means to synchronize the modified parameter to flash in the command of parameters setting type

'=?' means to query the current setting in the command of parameters setting type

<CR> means enter it's 0x0d in ASCII

■ Response message

+<RSP>[op][para1],[para2], [para3] ,[para4]…<CR><LF><CR><LF>

'+' means the leader of response message

RSP means response string

'OK' means success

'ERR' means fail

<CR> means enter it's 0x0d in ASCII

<LF> means newline it's 0x0a in ASCII

■ Data Type

String is enveloped with double quotation marks but its content does not include the quotation mark such as "this is a string".

Dec means number in decimal such as 10.

Hex means number in hexadecimal such as a.

IP means IP address string such as 192.168.0.1.

MAC means MAC address it's formed with 12 hexadecimal numbers such as 001EE3A80102.

9.1.1.1. Process Flow

AT+Instruction protocol uses the form of command+response most of instructions need a response message after the receiver has processed the instruction ,if the receiver receive a new command acquire in the process of processing the previous command it will throw the command away stealthily without any response message the process is shown as following figure.

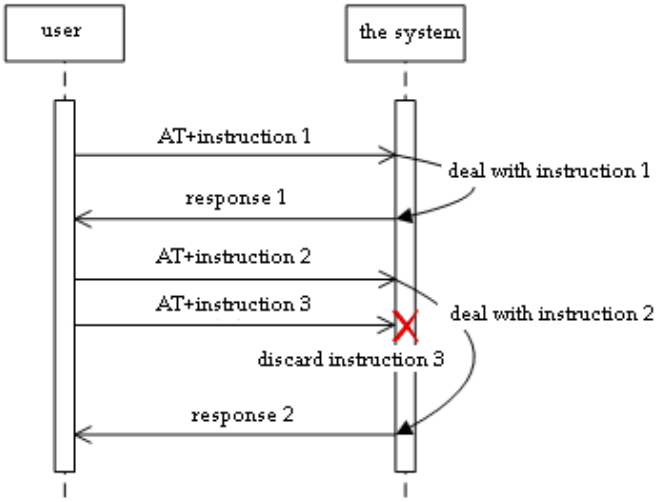

Figure 9-1 Process flow of AT+Instruction

Some special commands such as AT+SKSND and AT+SKRCV, need to transmit binary data behind command or response, at this moment data receiver becomes into diaphanous transmission status provisionally and begins to receive binary numbers flow, until it has received the data of which length is prescribed in the <SIZE> field of command or message or waits for timeout then it exits transparent transmission mode, the flow is shown as follow,

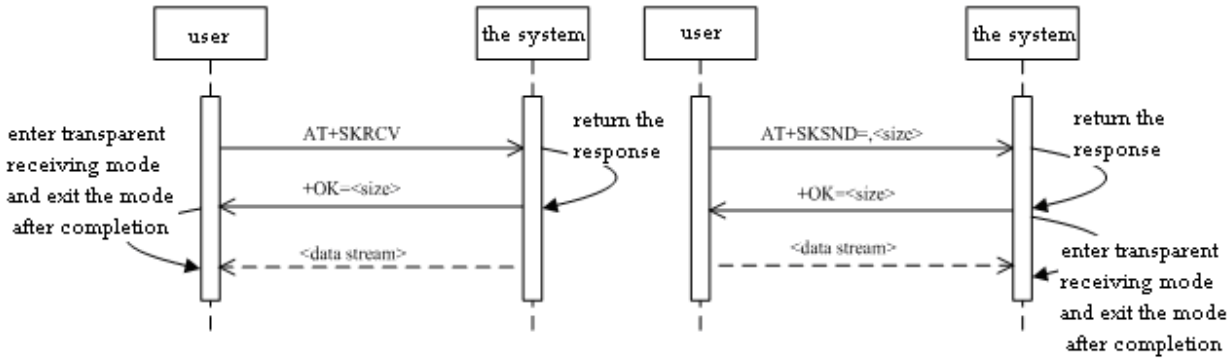

Figure 9-2 AT+Instruction special process flow

9.1.1.2. Format Examples

Example 1: response success message

```
AT+

+OK
```

Example 2: response failed message

```
AT+WJOIN

+ERR=-10
```

Example 3: Using input parameter

```
AT+UART=9600,1,1,0

+OK
```

Example 4: Using the symbol <!>

```
AT+ATPT=!500

+OK
```

Example 5 ： Using the symbol <?>

```
AT+ATPT=?

+OK=500
```

9.1.1.3. Error Code

Value	meanings
-1	Ineffective Command Format
-2	Non supported
-3	Ineffective Operation Symbol
-4	Ineffective Parameter
-5	Not Permitted
-6	Memory Lack
-7	FLASH Error
-10	Join Failed
-11	No Available socket
-12	Ineffective Socket
-13	Socket Connect Failed
-100	Undefined

9.2.Instruction Set

9.2.1. Instruction List

AT+Instruction list

name	use
(null)	Null
ATLT	Set or query data length of automatic framing
ATM	Set or query work mode of module
ATPT	Set or query period of automatic framing
ATRM	Set or query connection message of socket module creates automatically in auto-work mode
BSSID	Set or query bssid address of target AP
CHL	Set or query target wireless channel number
CHLL	Set or query wireless channel list
CMDM	Set or query default command mode of system
E	Switch serial character to show back
ENCRY	Set or query security mode of wireless network
ENTM	Set module into transparent transmission mode
ESPC	Set or query escape character
ESPT	Set or query escape time
IOC	GPIO Control
IOM	Set or query GPIO mode

KEY	Set or query key of wireless network
LKSTT	Query network connection state
NIP	Set or query local IP address
PASS	Set or query system password
PMTF	Update parameters in memory to Flash
QMAC	Query physical address
QVER	query version
RSTF	Return to manufacturer setting
SKCLS	Close socket connection
SKCT	Create socket connection
SKRCV	Receive data through socket connection
SKSDF	Set default sending socket connection
SKSND	send data through socket connection
SKSTT	query socket connection state
SSID	Set or query SSID
UART	Set or Query serial data format
WARC	Set or query automatic retry times in auto-work mode
WARM	Set or query wireless roam
WATC	Set or query whether to create Adhoc network automatically
WBGR	Set or query wireless BG mode and maximum send rate
WEBS	Set or query web service

WJOIN	Join in or create network
WLEAV	Disconnect network
WPRT	Set or query wireless mode
WSCAN	Scan for network
Z	Reset

9.2.2. Network Control Type

9.2.2.1. AT+WJOIN

Function：

Join/Create a wireless network If the type of current network is adhoc and the module cannot search for the same ssid network then it automatically creates a new network or it has been connected then return the message of network connection.

Format：

AT+WJOIN<CR>

+OK=<*bssid*>,<*type*>,<*channel*>,<*b_encry*>,<*ssid*>,<*rssi*><CR><LF><CR><LF>

Parameter：

bssid means network BSSID,it is formed with twelve hexadecimal Numbers and the format is 001EE3A34455

type means Network Type

Value	Meanings
0	Infra network
1	adhoc network

channel means Channel Number

b_encry means Encryption Mode

Value	Meanings
0	Open
1	Encryption

ssid means Wireless network name it's formed with 1~32 Character and embedded by double quotation marks

rssi means Network Signal Strength it does not include minus its unit is DBm For example 50 means that the strength is -50 DBm.

9.2.2.2. AT+WLEAV

Function ：

Disconnect the current network。

Format ：

AT+WLEAV<CR>

+OK<CR><LF><CR><LF>

Parameter：

None

9.2.2.3. AT+WSCAN

Function：

Scan and return after finishing.

Format：

AT+WSCAN<CR>

+OK=<*bssid*>,<*type*>,<*channel*>,<*b_encry*>,<*ssid*>,<*rssi*><CR><LF>

<*bssid*>,<*type*>,<*channel*>,<*b_encry*>,<*ssid*>,<*rssi*><CR><LF>

……

<CR><LF>

Parameter：

Same as AT+WJOIN

9.2.2.4. AT+LKSTT

Function：

Query the network connection status。

Format：

AT+LKSTT<CR>

+OK[=*status,ip,netmask,gateway,dns*]<CR><LF><CR><LF>

Parameter：

Status means Connection Status

Value	Meanings
0	Disconnect
1	connect

ip means IP address,its format is "192.168.1.22",it does not include quotation marks

netmask means Subnet Mask its format is same as IP address

gateway means Gateway address its format is same as IP address

dns means DNS address its format is same as IP address

9.2.2.5. AT+SKCT

Function：

Create a socket connection In client mode module wait for connection is over(success or failure) to return and in server mode it return after creating a network.

Format：

AT+SKCT=*[protocol],[cs],[host_timeout],<port>*<CR>

+OK=<*socket*><CR><LF><CR><LF>

Parameter：

protocol ： Protocol Type，

Value	Meanings
0	TCP
1	UDP

cs ： C/S mode，

Value	Meanings
0	Client
1	Server

the meanings of *host_timeout is* shown as follows according to protocol and C/S mode.

cs	protocol	Meanings
0	X	Name of target server it can be filled with domain name or ip address For example "192.168.1.100"or "www.sina.com.cn"
1	0	TCP connection timeout period,it means client will be automatically kicked out from server if it send nothing in effective period Effective value range is 1~10000000,Unit:second,0 means never default setting is 120 seconds
1	1	No Meanings

port means Port number

socket means socket number

9.2.2.6. AT+SKSND

Function ：

Send data through the specified socket and return when it is over This command send binary data, User should send original data after receiving the response(+OK) of module.

Module automatically exits transmission after receiving the data of specified length and send data to the network, the redundant date will be rejected. Otherwise module will be forced to constrainedly exit transmission mode and send the data has been received to the network when the module has waiting for timeout period(1 second).

Format ：

AT+SKSND=<*socket*>,<*size*><CR>

+OK=<*actual size*><CR><LF><CR><LF>

[data steam]

Parameter ：

socket means socket number

size means the size of the data which prepare to be send, its unit is type.

Actual size means the size of the data which actually is send, its unit is type.

data steam means original data.

9.2.2.7. AT+SKRCV

Function ：

Read data form RX buffer of the target socket and return after finished. After receiving this command and sending the response(+OK) is over ,module will transmit the data of specified size in binary format

Format ：

AT+SKRCV=<*socket*>,<*maxsize*><CR>

+OK=<*size*><CR><LF><CR><LF>

[data stream]

Parameter ：

socket means socket number

maxsize means maximal data size allows to receive

size means actually size of the receiving data

data steam means original data

9.2.2.8. AT+SKSTT

Function ：

Acquire the state of the specified socket, the first line of return value means the state of the message of the socket if the socket mode is TCP server then beginning from the first line, each line shows a socket state of a client which is joined in the server

Format ：

AT+SKSTT=<*socket*><CR>

+OK=<*socket*>,<*status*>,*[host],[port],[rx_data]*<CR><LF>

[socket],[status],[host],[port],[rx_data]<CR><LF>

...

<CR><LF>

Parameter ：

socket means socket number

status means socket state

Value	Meanings
0	Disconnected
1	Detecting
2	Connected

host means IP address of the opposite terminal

port means port number of the opposite terminal

rx_data means data size in RX buffer

9.2.2.9. AT+SKCLS

Function:

Close the specified socket

Format：

AT+SKCLS=<*socket*><CR>

+OK<CR><LF><CR><LF>

Parameter:

socket means socket number

9.2.2.10. AT+SKSDF

Function：

Set the default sending socket of system If user needs to enter transparent transmission mode in command mode using this command can send the transparent data from serial port to the destination.

Format：

AT+SKSDF=<*socket*><CR>

+OK<CR><LF><CR><LF>

Parameter：

socket means socket number

9.2.3. System control type

9.2.3.1. AT+

Function ：

Null command

Format ：

AT+<CR>

+OK<CR><LF><CR><LF>

Parameter ：

None

9.2.3.2. AT+Z

Function ：

Reset system

Format ：

AT+Z<CR>

+OK<CR><LF><CR><LF>

Parameter ：

None

9.2.3.3. AT+E

Function ：

Switch serial command to return

Format ：

AT+E<CR>

+OK<CR><LF><CR><LF>

Parameter ：

None

9.2.3.4. AT+ENTM

Function ：

Enable the serial to enter to transparent transmission mode. System exit this mode when it has received escape character according with escape term in transparent transmission mode

Format ：

AT+ENTM<CR>

+OK<CR><LF><CR><LF>

Parameter ：

None

9.2.3.5. AT+RSTF

Function ：

Return to manufacturer settings in flash System need to restart and then the settings become effective.

Format ：

AT+RSTF<CR>

+OK<CR><LF><CR><LF>

Parameter ：

None

9.2.3.6. AT+PMTF

Function ：

Parameters which are saved in the memory are updated to the flash

Format ：

AT+PMTF<CR>

+OK<CR><LF><CR><LF>

Parameter ：

None

9.2.3.7. AT+IOC

Function ：

GPIO input or output control. IO status is allowed to read when GPIO1 is set to input mode(the mode of AT+IOM is 1), IO status is allowed to write when GPIO1 is set to output mode(the mode of AT+IOM is 2)

Format ：

AT+IOC=*[?][status]*<CR>

+OK*[=status]*<CR><LF><CR><LF>

Parameter ：

status means IO Status

Value	Meanings
0	High level
1	Low level

9.2.3.8. AT+QMAC

Function ：

Aquire physical address of the module.

Format ：

AT+QMAC<CR>

+OK=<*mac address*><CR><LF><CR><LF>

Parameter ：

mac address is twelve hexadecimal Number format is 001EE3A34455

9.2.3.9. AT+QVER

Function：

Acquire version of system the version message includes hardware version and firmware version.

Format：

AT+QVER<CR>

+OK=<*hard,firm*><CR><LF><CR><LF>

Parameter：

hard means hardware version its format is string such as" H1.00.00.1029"

firm means firmware version, its format is string ,such as " F0.02.02@ 18:25:25 Jul 28 2010"

9.2.4. Parameter Setting Type

9.2.4.1. AT+NIP

Function：

Set or query local IP address The dynamic IP address cannot be queried if address type is set to DHCP.AT+LKSTT command can be used to query.

Format：

AT+NIP=*[!?][type],[ip],[netmask],[gateway],[dns]*<CR>

+OK*[=type,ip,netmask,gateway,dns]*<CR><LF><CR><LF>

Parameter：

type means address type

Value	Meanings
0	Use DHCP to assign dynamic IP address
1	assign static IP address

ip means IP address data format is such as "192.168.1.22",not including quotation marks

netmask means subnet mask data format is the same as IP address

gateway means Gateway address data format is the same as IP address

dns means DNS address data format is the same as IP address

9.2.4.2. AT+ATM

Function：

Set or query work mode of module

Format：

AT+ATM=*[!?][mode]* <CR>

+OK*[=mode]*<CR><LF><CR><LF>

Parameter：

mode means work mode

Value	Meanings
0	Auto-work mode
1	Command mode

9.2.4.3. AT+ATRM

Function：

Set or query the message of the connection the module creates automatically in auto-work mode.

Format：

AT+ATRM=*[!?][protocol],[cs],[host_timeout],[port]*<CR>

+OK*[=protocol,cs,host,port]*<CR><LF><CR><LF>

Parameter：

protocol means protocol type，

Value	Meanings
0	TCP
1	UDP

cs means C/S mode，

Value	Meanings
0	Client
1	Server

host_timeout means that shown as follow,

cs	protocol	Meanings
0	X	destination server name， you can input domain name or IP address for example: "192.168.1.100"or "www.sina.com.cn"
1	0	TCP connection timeout period the clients that connect with the server send noting in this effective period will be kicked out, effective value range is 1~10000000,its Unit is second,0 means never default setting is 120 seconds
1	1	No meaning

port means port number

9.2.4.4. AT+SSID

Function：

Set or query wireless network name, namely ssid

Format：

AT+SSID=*[!?][ssid]*<CR>

+OK*[=ssid]*<CR><LF><CR><LF>

Parameter：

ssid means wireless network name it's formed with 1~32 characters and embedded in double quotation marks

9.2.4.5. AT+ENCRY

Function：

Set or query wireless network encryption mode What should be noted is that every encryption modes need to set correct key to cooperate with AT+KEY command except OPEN mode.

Format：

AT+ENCRY=*[!?][encry mode]*<CR>

+OK*[=encry mode]*<CR><LF><CR><LF>

Parameter：

encry mode means encryption mode

Value	Meanings
0	OPEN
1	WEP64
2	WEP128
3	WPA-PSK(TKIP)
4	WPA-PSK(CCMP/AES)
5	WPA2-PSK(TKIP)
6	WPA2-PSK(CCMP/AES)

9.2.4.6. AT+KEY

Function：

Set or query network key. What should be noted is that before using this command to set network key user must set the encryption mode with the command AT+ENCRY .

Format：

AT+KEY=*[!?][format],[index],[key]*<CR>

+OK*[=format,index,key]*<CR><LF><CR><LF>

Parameter：

format means key format

Value	Meanings
0	HEX
1	ASCII

index means key index,1～4 is used in wep key, in other encryption modes it's set 0

key means key string,it's embedded in double quotation marks according to different encryption modes key size and key format is defined as follows

Encryption mode	Key Format	
	HEX	ASCII
WEP64	10 hexadecimal characters (Note 1)	5 ASCII characters (Note 2)
WEP128	26 hexadecimal characters	13 ASCII characters
WPA-PSK(TKIP)	64 hexadecimal characters	8~63 ASCII characters
WPA-PSK(CCMP/AES)	64 hexadecimal characters	8~63 ASCII characters
WPA2-PSK(TKIP)	64 hexadecimal characters	8~63 ASCII characters
WPA2-PSK(CCMP/AES)	64 hexadecimal characters	8~63 ASCII characters

Note1 ： hexadecimal characters means 0~9 and a~f （no division of majuscule and lowercase） ， for example"11223344dd"

Note2 ： ASCII character means the numbers (0~9) and characters (a~z and A~Z) in ASCII character set which is specified by ISO for example "14u6E"

9.2.4.7. AT+BSSID

Function ：

Set or query bssid address of the target AP The configuration is only effective in infrastructure network

Format ：

AT+BSSID=*[!?][mode],[bssid]*<CR>

+OK*[=mode,bssid]*<CR><LF><CR><LF>

Parameter ：

mode means BSSID Mode

Value	Meanings
0	auto
1	specified

bssid means Network BSSID its size is twelve hexadecimal numbers format is such as 001EE3A34455

9.2.4.8. AT+CHL

Function ：

Set or query the specified wireless channel

Format ：

AT+CHL=*[!?][mode],[channel]*<CR>

+OK*[=mode,channel]*<CR><LF><CR><LF>

Parameter：

mode means channel mode

Value	Meanings
0	auto
1	specified

channel means wireless channel number effective range is 1～14

9.2.4.9. AT+CHLL

Function：

Set or query wireless channel list. Wireless channel list is used to prescribe work channel range of module. The channel not included in the channel list will not be scanned, reasonably using this parameter can expedite the speed of scanning and networking of module.

Format：

AT+CHLL=*[!?][channel list]*<CR>

+OK*[=channel list]*<CR><LF><CR><LF>

Parameter：

channel list means wireless channel list it uses hexadecimal format it begins from the lowest bit each bit means a channel the default setting is 3fff,that means all of 1~14 channels.

9.2.4.10. AT+WPRT

Function:

Set or query wireless network type.

Format:

AT+WPRT=*[!?][type]*<CR>

+OK*[=type]*<CR><LF><CR><LF>

Parameter:

type means network type.

Value	meanings
0	Infrastructure network
1	Adhoc network

9.2.4.11. AT+WATC

Function:

Set or query whether to enable to create adhoc network automatically.This parameter is only effective when wireless network type is set to adhoc . it means whether to create a adhoc network with the same SSID when networking is failed.

Format:

AT+WATC=*[!?][enable]*<CR>

+OK*[=enable]*<CR><LF><CR><LF>

Parameter

enable means the symbol of enabling.

Value	Meanings
0	disabled
1	enabled

9.2.4.12. AT+WARM

Function:

Set or query whether to enable the wireless roam.

Format:

AT+WARM=*[!?][enable]*<CR>

+OK*[=enable]*<CR><LF><CR><LF>

Parameter:

enable means the symbol of enabling.

Value	meanings
0	disabled
1	enabled

9.2.4.13. AT+WARC

Function:

Set or query the function of auto retry after the wireless network is disconnected or networking is failed. This parameter is only effective in the auto-work mode.

Format:

AT+WARC=*[!?][count]*<CR>

+OK*[=count]*<CR><LF><CR><LF>

Parameter:

count means retry times.

Value	Meanings
0	No retry
1~254	1~254 times of retry
255	Retry for ever

9.2.4.14. AT+WBGR

Function:

Set or query BG mode of the wireless network and the maximum sending rate.

Format:

AT+WBGR=*[!?][bg mode],[max rate]*<CR>

+OK*[=bg mode,max rate]*<CR><LF><CR><LF>

Parameter:

bg mode mean BG mode

Value	Meanings
0	B/G fixed
1	B

max rate means the maximum sending rate, in B mode, only 0 to 3 is effective

Value	Meanings
0	1 Mbps
1	2 Mbps
2	5.5 Mbps
3	11 Mbps
4	6 Mbps
5	9 Mbps
6	12 Mbps
7	18 Mbps
8	24 Mbps
9	36 Mbps
10	48 Mbps
11	54 Mbps

9.2.4.15. AT+UART

Function:

Set or query data format of uart serial.

Format:

AT+UART=*[!?][baud rate],[data bit],[stop bit],[parity]*<CR>

+OK*[=baud rate,data bit,stop bit,parity]*<CR><LF><CR><LF>

Parameter:

baud rate means baud rate, effective range is from 1200 to 115200,

Value	Meanings
115200	115200 bps
57600	57600 bps
38400	38400 bps
19200	19200 bps
9600	9600 bps
4800	4800 bps
2400	2400 bps
1200	1200 bps

data bit means data bits

Value	Meanings
0	8 bits
1	7 bits

stop bit means stop bits

Value	Meanings
0	1 bit
1	Not supported
2	2 bits

parity means parity bit

Value	Meanings
0	No parity
1	Odd parity
2	Even parity

9.2.4.16. AT+ATPT

Function:

Set or query the auto framing period of data data is automatically set frame period. This parameter is only effective when serial is in transparent transmission mode.

Format:

AT+ATPT=*[!?][period]*<CR>

+OK*[=period]*<CR><LF><CR><LF>

Parameter:

period means auto framing period, its range is 100 ~ 10000ms, and its units is millisecond, the smallest step is 100ms.

9.2.4.17. AT+ATLT

Function:

Set or query the data auto framing length of data. This parameter is only effective when serial is in transparent transmission mode.

Format:

AT+ATLT=*[!?][length]*<CR>

+OK*[=length]*<CR><LF><CR><LF>

Parameter:

length means auto framing length, its range is 64 ~ 1024 bytes.

9.2.4.18. AT+ESPC

Function:

Set or query escape characters. This parameter is used for serial to exit the transparent transmission mode.

Format:

AT+ESPC=*[!?][escape]*<CR>

+OK*[=escape]*<CR><LF><CR><LF>

Parameter:

escape means escape characters its format is two ASCII characters expressed in hexadecimal such as ASCII character '+' should be expressed as '2B'.

9.2.4.19. AT+ESPT

Function:

Set or query escape time This parameter is used for serial to exit the transparent transmission mode.

Format:

AT+ESPT=*[!?][time]*<CR>

+OK*[=time]*<CR><LF><CR><LF>

Parameter:

time means escape time its range is 100 ~ 10000ms,its unit is millisecond, the smallest step is 100ms.

9.2.4.20. AT+WEBS

Function:

Set or query whether to enable the internal WEB server.

Format:

AT+WEBS=*[!?][enable],[port]*<CR>

+OK*[=enable,port]*<CR><LF><CR><LF>

Parameter:

enable means the symbol of enabling.

Value	Meanings
0	disabled
1	enabled

port means server port number, the default setting is 80.

9.2.4.21. AT+PASS

Function:

Set or query the system password.

Format:

AT+PASS=*[!?][pass]* <CR>

+OK*[=pass]*<CR><LF><CR><LF>

Parameter:

pass means system password it's formed with 6 ASCII characters.

9.2.4.22. AT+IOM

Function:

Set or query GPIO1 mode.

Format:

AT+IOM=*[!?][mode]*<CR>

+OK*[=mode]*<CR><LF><CR><LF>

Parameter:

mode means work mode.

Value	Meanings
0	System function
1	Input
2	Output

9.2.4.23. AT+CMDM

Function:

Set or query default command mode of the system.

Format:

AT+CMDM=*[!?][mode]*<CR>

+OK*[=mode]*<CR><LF><CR><LF>

Parameter:

mode means the type of command mode.

Value	Meaning
0	AT+Instruction
1	Compatible potocol

9.2.5. Operation flow of WiFi module in command mode

Usually the operation flow of WiFi module in command mode is shown as the following figure While module is in use user can decide whether to do the operation of the command line according with the state of system.

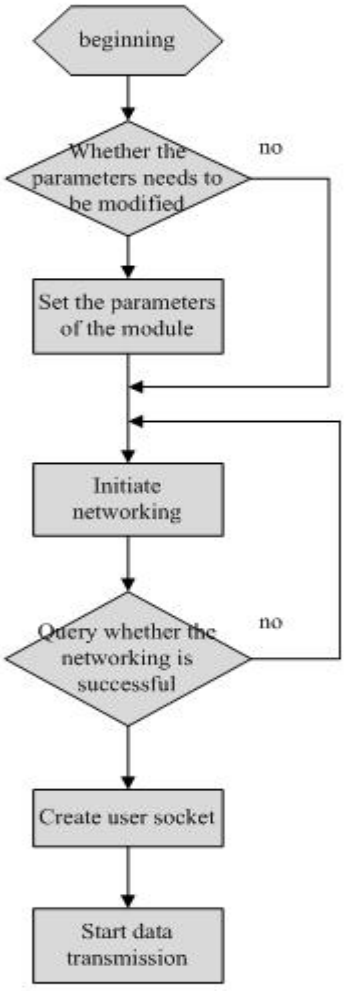

Figure 9-3 the operation of Wifi module

Appendix A: Frequent Ask Questions

Q1: Why the module cannot search for the specified network?

A: The channel list user set doesn't contain the channel which the specified network working.

Q2: Why cannot the module join in the network?

A: Please go through the following reasons,

Whether the parameters SSID, Key, Channel and so on are consistent with the AP sets or not.

Whether the module is specified BSSID , and the BSSID is not consistent with the AP sets.

Q3: Why does the module need about 10 seconds to response the command or connect to network automatically, when encryption mode is set to WPA/WPA2?

A: When encryption mode is set to WPA/WPA2, as the key format is ASCII, the module must first do the conversion to the key of ASCII format when it's power-on, this process increases about 10 seconds to the starting time And When using WPA/WPA2 encryption, directly using PMK of hexadecimal format can eliminate this delay. The specific method is referred in Section 7.2.1.5.

Q4: The module has connected to the network successfully why can't it show "Destination host unreachable" or "Request timed out" after doing the operation ping between the module and PC.

A: Please check the network setting, check whether the IP address and so on is correct or not.

Check whether the encryption mode is consistent with the AP sets or not, because in certain encryption mode, such as WEP encryption with open authentication even if the key is not correct module will join in the AP but they can't communicate.

Maybe certain operating program or Windows Firewall prevents from the operation ping.

Q5: In auto-work mode the ICMP connection sometimes connects and sometimes disconnects after the module has joined in the network why?

A: The module will create a default network connection after joined in network if the TCP server which is the default target of the network connection is configured unsuccessfully or not opened, the module will disconnect the wireless connection after failed TCP connection and retry to connect in 10 seconds. And then it appears that ICMP connection sometimes connects and sometimes disconnects. To settle this question is correct configuration of TCP server and opening it.

Q6: In auto-work mode why does the module not connect to the network automatically after resetting?

A: The module forces to go into the configuration mode according the state of MODE pin after start-up, The specific is referred in Section 7.1.1

Q7: In auto-work mode data sent to the module through serial will delay sometime to send to the network why?

A: In auto-work mode framing and sending data has two trigger qualification trigger time and trigger length if the length of data doesn't reach the trigger length and it will wait to be framed and sent coercively after trigger time the specific is referred in Section 7.1.2.2

Q8: In auto-work mode why does the module not exit the transmission state, after send the escape character?

A: To exit transparent transmission has strict limits, the specific is referred in Section 7.1.2.4.

Q9: Why cannot the configuration program search for the target module?

A: The serial setting of configuration program is not consistent with the serial setting of the module;

The module is in auto-work mode please reset it. be sure LED1 and LED2 is illumed and then retry the search.

Q10: To modify the parameters with configuration program why does it show the error 'used prohibitive operating symbol'?

A: Please disconnect the network connection first and then refer the modified parameters.

Q11: Why cannot web pages of the WEB server open?

A ： The reasons maybe include,

whether the WEB server is forbidden

Whether the server port is set correctly or not, if the port is set to the number except 80,then it's needed to input the port number in the address bar while using a browser, such as http://192.168.1.100:2000.

Q12: When user sets the serial to the baud rate it does not support, the module can't be connected to, then how to correct it ?

A ： Resume it to the manufacturer setting the approach is as follow,

1) Open the serial debugging software such as terminal2 or Hyperterminal set the serial parameters to 115200bps/8 bits of data bits/1 bit of stop bits/no parity of parity bit/no flow control.
2) Input 'at+'(no contain quotation marks and contain enter) in the sending column of the software choose periodic sending the period is set to 50ms.
3) Reset the module if it return '+OK' then stop the periodic sending.
4) Send the command'AT+QVER' to look over the return message if the message includes B1.xx field then it joins in bootloader mode successfully otherwise it's not in retry from the 2th approach.
5) Send the command 'AT+QVER'(no return).
6) Wait for 1 second and reset the module then it can be resume to the manufacturer state.

Q13 ： In Wireless connection state why cannot the specified module be searched for?

A: The reasons includes,

The signal between the netcard and the specified module is weak.

System password of wireless connection setting is not consistent with the specified module.

MAC address in wireless connection setting is specified.

Q14: In some environment the module used， why is the quality of wireless connection always bad and how to improve the wireless transmission?

A: The reasons which cause bad quality of wireless connection are multiple such as those the placement of AP is not reasonable, the distance between AP and module is too far there are some obvious screens or shelter between AP and module in the environment module works there are some disturbance of 2.4G band and so on Some environmental problems can't be resolved fundamentally, it can be only reduced for adverse effects with some methods, user can try to do the changes as follow,

1) Lay AP in open and no obvious shelter environment as much as possible, in particular, to avoid large areas of metal and the corners of wall.
2) Modify the setting of AP change the channel far from the current channel such as those change the channel from 1 to 6, or from 6 to 13 and so on.
3) Modify the maximum rate of advanced wireless parameters reduce it to 11Mbps or even lower.

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